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[redacted]

REPORT

OF

THE ARMY AIR FORCES

ORLANDO, FLORIDA

SUBJECT

TACTICAL DOCTRINE OF TROOP CARRIER AVIATION

AAF BOARD PROJECT NO. 3189A461

DATE

4 Sept 1945

COPY NO. 2

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HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

AFDRP 13 Jan 1946

SUBJECT: AAF Board Project No. 3139, Tactical Doctrine of Troop Carrier Aviation,

TO: Commanding General
Army Air Forces Center
Orlando, Florida

Attention: Army Air Forces Board

1. AAF Board report No. 3139, Tactical Doctrine of Troop Carrier Aviation, has been revised and is approved by this headquarters.

2. Action will be initiated to have the subject report published as a War Department Field Manual.

BY COMMAND OF GENERAL ARNOLD:

/s/ Allen Andrews, Maj, AC
for /t/ EDWIN S. VANDENBERG
Lt. General, U.S.A.
Assistant Chief of Air Staff-3

A TRUE COPY

EARL L. LUPTON
1st Lt., Air Corps

[redacted]

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HEADQUARTERS
ARMY AIR FORCES PROVING GROUND COMMAND
EGLIN FIELD, FLORIDA

7 FEB 1948

Please address reply to:
Commanding Officer
AFPGC
Eglin Field, Florida
Attn: Proof Division

SUBJECT: Hq. AAF Approval Letter

TO: Distribution

1. Attached is a communication from Headquarters, Army Air Forces indicating action taken upon recommendations contained in Army Air Forces Board Project No. 3189 Bd.

2. It is requested that copies of the report previously forwarded to your headquarters be amended by attaching inclosed letter thereto.

FOR THE COMMANDING OFFICER:

Lloyd H. Watnee
LLOYD H. WATNEE,
Colonel, Air Corps,
Deputy for Proof Testing.

1 Incl.
Descr above

If inclosure is withdrawn (or not attached), the classification of this correspondence will be downgraded to Unclassified in accordance with paragraph 8b, AR 380-5.

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HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

AFRDP 13 Jan 1946

SUBJECT: AAF Board Project No. 3189, Tactical Doctrine of Troop Carrier Aviation.

TO: Commanding General
Army Air Forces Center
Orlando, Florida

Attention: Army Air Forces Board

1. AAF Board report No. 3189, Tactical Doctrine of Troop Carrier Aviation, has been reviewed and is approved by this headquarters.

2. Action will be initiated to have the subject report published as a War Department Field Manual.

BY COMMAND OF GENERAL ARNOLD:

for /s/ Allen Andrews, Maj, AC
/t/ [redacted]
Lt. General, U.S.A.
Assistant Chief of Air Staff-3

A TRUE COPY

Earl L. Lupton

EARL L. LUPTON
1st Lt., Air Corps

UNCLASSIFIED

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"This report is an information copy. No conclusive action will be taken thereon until such time as approval letter from Headquarters, Army Air Forces, has been received and incorporated therein."

TACTICAL DOCTRINE OF TROOP CARRIER AVIATION

CONTENTS

THE ARMY AIR FORCES BOARD
Orlando, Florida

4 September 1943

ARMY AIR FORCES BOARD PROJECT NO. 31394461

TACTICAL DOCTRINE OF TROOP CARRIER AVIATION

I. OBJECT.

The object of this staff study is to provide a text on the tactical doctrine of troop carrier aviation for publication as a War Department field manual.

II. FACTUAL DATA.

a. The project was activated by directive letter from CC&R, Headquarters, Army Air Forces, subject, "Manual on Tactics and Technique of Troop Carrier Aviation", dated 31 January 1944. (Inclosure I.)

b. A preliminary text was prepared and a conference held at Orlando, Florida, on 10 October 1944, attended by representatives of the Army Air Forces Board, Army Air Forces School, Airborne Center, I Troop Carrier Command, and Headquarters, Army Air Forces.

c. Following this conference and upon receipt of dated letter from CC&R, Headquarters, Army Air Forces, subject, "Principles of Airborne Operations Based on Actual Combat" (Inclosure II), a thorough study was made of Operation MARKET and other recent troop carrier-airborne operations in the European and Pacific theaters. Doctrinal results of this study, as well as the principles cited in Inclosure II, were incorporated in the revised field manual text.

d. Revised text (Inclosure III) has been coordinated with Headquarters, I Troop Carrier Command, Stout Field, Indiana.

III. CONCLUSIONS. It is concluded that:

a. Inclosure III, "Tactical Doctrine of Troop Carrier Aviation", is a satisfactory text for publication as a War Department field manual.

IV. RECOMMENDATIONS. It is recommended that:

a. Inclosure III, "Tactical Doctrine of Troop Carrier Aviation", be approved and published as a War Department field manual.

V. ENCLOSURES.

a. Inclosure I - Directive letter from OC&R, Headquarters, AAF, subject, "Manual of Tactics and Technique of Troop Carrier Aviation", dated 31 January 1944.

b. Inclosure II - Letter from OC&R, Headquarters, AAF, subject, "Principles of Airborne Operations Based on Actual Combat", undated.

c. Inclosure III - Field manual text, "Tactical Doctrine of Troop Carrier Aviation".

FOR THE ARMY AIR FORCES BOARD:

A.C. STRICKLAND
Brigadier General, U.S. Army
President.

OFFICIAL:

Robert C. Walker Jr.

ROBERT C. WALKER, Jr.
1st Lt., Air Corps,
Recorder

AAF Bd. Proj No. 3189A461

Enclosure I

DIRECTIVE FOR PROJECT

RESTRICTED

WAR DEPARTMENT

HEADQUARTERS OF THE ARMY AIR FORCES

WASHINGTON AFRET

31 January 1944.

UBJECT: Manual on Tactics & Technique of Troop Carrier Aviation.

) : Executive Director
Army Air Forces Board
Orlando, Florida.

1. It is requested that the Army Air Forces Board initiate a project to prepare a Field Manual on the "Tactics and Technique of Troop Carrier Aviation". There is no known manual on this subject, as such, though there are many publications incorporating the various phases Troop Carrier operations, usually under the heading of Air Transport. is desired that this project serve to consolidate the loose ends of oop Carrier aviation into a compact manual which will serve as a use-l guide and to clarify many of the misunderstandings on this type avia-on.

2. The existing publications which may serve as a useful source information on this project are: FM 31-30, FM 31-35, FM 31-40, FM 100-5, FSAT Project (T-2) 10, on "Development and Technique of Gliders", dated October 43 and AAFSAT report, Project No. (T-5) 35-A, dated 13 December 43. Intelligence reports on the Sicilian, Salerno and Lee Troop Carr operations may also be of value. In as much as the Airborne Command in the process of revising FM 31-30, it is recommended that necessary ordination be made to insure that no conflict in tactical doctrine will ise. Attached hereto is a report of the January Combined Airborne-oop Carrier Maneuvers, which is a practical illustration of a Troop rrier operation and which may be of interest in this project.

3. It is desired that the proposed manual present a complete ture of Troop Carrier in its various phases with special emphasis be-placed on the training of crews and units, operations, and a complete munications survey to include navigational aids. It must be noted that comprehensive manual on this subject would of necessity include a con-lerable amount of information on the tactical use of gliders. In ad-ion a sufficient amount of information must be included on the em-yment of airborne forces to indicate the close coordination which must st between Troop Carrier and airborne forces when such operations are templated.

4. Troop Carrier aviation is a comparatively recent branch of the y Air Forces and a thorough understanding of its tactical capabilities not generally recognized. In order to insure that adequate information

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on Troop Carrier aviation may be disseminated through this manual at an early date, it is requested that this project be given a classification of second priority.

By command of General ARNOLD:

/s/ Raleigh H. Macklin, Col.
for H. A. CRAIG
Brigadier General, U. S. Army
Asst. Chief of Air Staff
Operations, Commitments & Requirements.

2 Incls: -
Rpt of Combined TC-AIR Maneuvers
Training Circular 113.
N/D
(Not Included)

Enclosure II

LETTER FROM OC&R, HEADQUARTERS AAF, SUBJECT:

"PRINCIPLES OF AIRBORNE OPERATIONS BASED ON ACTUAL COMBAT," UNDATED

RESTRICTED

HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

SUBJECT: Principles of Airborne Operations Based on Actual Combat.

TO : President, Army Air Forces Board, Orlando, Florida.

1. The Army Air Forces Board is now in the process of preparing a War Department Field Manual on the "Tactical Doctrine of Troop Carrier Aviation". Attached hereto is a memorandum, dated 4 November 1944, subject, "Narrative of MARKET Operation" with three inclosures for your information and study in connection with the Field Manual which you are preparing. The inclosed memorandum with its inclosures are highly classified because of their references to operations in theaters of operation. This letter and the statements of principles extracted from the attached papers are not and need not be classified. Some of the more definitely established principles of operation extracted from the attached data, and which may well be considered as pertinent to the Field Manual on "Tactical Doctrine of Troop Carrier Aviation", follow:-

a. Sound airborne operation planning is simply an application of the principles of war, economy of force and mass. A force adequate to accomplish its mission must be assigned the most vital mission and sufficient assistance must be given it to occupy the enemy during the execution of the mission.

b. The establishment of air fields or landing strips must be made an initial objective in all airborne operations.

c. Communication must be positive and well-established between the bases from which operations are launched.

d. Concentrate the maximum force on the principal objective. An all-out effort with everything that can fly must take advantage of the initial surprise by dropping the maximum of supplies and reinforcements before the enemy can muster his air, flak, and ground defenses.

e. All troop drops and landings from the outset must be in combat teams, irrespective of how small the combat team is.

f. Positive communications are absolutely essential between the airborne troops on the ground, the air commander, and the bases from which the operation is being launched.

g. The employment of troop carrier units for air supply is a proper commitment in periods of emergency.

h. Continued cargo carrier (air supply) operations will render troop carrier aviation increasingly unfit for an efficient airborne operation.

i. The glider, while valuable, has a limited application; is extremely uneconomical because it can seldom be used for more than one operation; the same statement of uneconomy applies equally to pilots and crews who operate the gliders.

j. The Troop Carrier organization must be intimately tied in with the organization of the airborne troops to produce a tactically homogeneous lift.

By command of General ARNOLD:

/s/ Donald Wilson
DONALD WILSON
Brigadier General, U. S. Army
Asst. Chief of Air Staff
Operations, Commitments &
Requirements

Incl: Memo dtd 4 Nov, same subj.
w/3 Incl. (Not Included)

Enclosure III

FM 1-x

WAR DEPARTMENT

ARMY AIR FORCES
FIELD MANUAL

TACTICAL DOCTRINE
OF TROOP CARRIER AVIATION

TABLE OF CONTENTS

CHAPTER 1

GENERAL

CHAPTER 1

GENERAL

1. PURPOSE AND SCOPE.— This manual contains instructions relative to the tactical doctrine of troop carrier aviation.

2. ORGANIZATION AND FUNCTIONS.— a. Troop carrier aviation in zone of the interior.— Troop carrier units within the continental United States are organized into a troop carrier command, the commanding general of which is responsible for the training of troop carrier, air evacuation, airborne engineer (aviation), and air cargo resupply units. See figure 1.

b. Troop carrier aviation in theaters of operations.—(1) Troop carrier units in a theater will normally be operated by the theater air forces commander and will constitute the theater troop carrier command. This command may be further assigned to a tactical air force or specially organized task force. See figures 2 to 4.

(2) The troop carrier command is the principal air force agency available to the theater commander in the planning, training, and conduct of combat operations requiring air transportation of troops, equipment, and supplies. In large-scale air-ground-naval operations, direct control of this aviation will be exercised by the theater commander.

(3) The primary functions of the troop carrier command are to transport troops and equipment into combat and to withdraw troops and evacuate casualties within combat zones and forward areas and between such zones or areas and appropriate terminal points. The secondary function is to furnish air transportation of personnel, equipment, and supplies as directed by the theater air forces commander.

3. DEFINITIONS.— a. Troop carrier aviation.— Air force units which are specially organized, equipped, and trained to transport troops and supplies into combat, to resupply such forces until they are withdrawn or can be supplied by other means, and to evacuate casualties, troops, and material. Troop carrier units should not be confused with elements of the air transport command, which has the primary mission of transporting personnel, supplies, and mail between theaters.

b. Airborne units.— As used in this manual, the term "airborne" is restricted to those ground force units which are specially organized equipped, and trained to utilize air transportation into combat. Normally such units will comprise parachute and glider-borne elements.

c. Air landing units.— Units which may be transported by air but which are not specifically organized, equipped, and trained for this method of movement.

d. Airborne task forces.— Troop carrier and airborne units (with or without air-landing units) organized for the accomplishment of a specific mission by air transportation. Such task forces will vary in size and organization up to and including an airborne army, depending on the mission to be performed.

e. Long range penetration forces.— Troop carrier and airborne or other ground units operating in the enemy's zone of communications or rear area of his combat zone to disorganize communications, prevent the withdrawal of enemy troops, and prevent the forward movement of supplies and reserves. Such forces may also be employed in the exploitation of partisan warfare.

f. Combat cargo units.— Special units of troop carrier aviation organized, equipped, and trained for tactical employment as combat carriers of materiel and personnel.

g. Drop zone.— A designated area where parachute units are dropped or where supplies are dropped with or without parachutes from aircraft in flight.

h. Landing zone.— A designated area where gliders may be landed.

i. Landing strip.— An improvised strip for landing operations of airplanes or gliders.

j. Air head.— An area including a landing zone, landing strip, or airfield with facilities to serve as a point from which the tactical disposition of troops and supplies can be accomplished.

k. Pathfinders.— Special airplanes and teams equipped and trained to locate and mark drop zones and landing zones for following serials of parachute and glider-borne units.

l. Air evacuation.— Withdrawal by air transportation of personnel and materiel. Such missions include tactical air evacuation and medical air evacuation.

4. REFERENCES.—

a. Army Air Forces Regulations.—

(1) 20-1, Organization, Army Air Forces.

(2) 20-44, Responsibilities for Air Transportation.

b. Field Manuals.—

(1) 31-30, Tactics and Technique of Airborne Troops.

(2) 31-40, Transportation of Supplies by Air.

(3) 100-5, Field Service Regulations: Operations.

(4) 100-20, Field Service Regulations: Command and Employment of Air Power.

(5) 101-10, Staff Officers' Field Manual: Organization, Technical and Logistical Data.

(6) 101-10, Air Staff Officers' Field Manual: Organization, Technical and Logistical Data (Command and General Staff School, Fort Leavenworth, Kansas).

c. Technical Manuals.—

(1) 1-300, Basic Glider Training.

(2) 1-315, Advanced Glider Training.

d. Training Standards.—

(1) 90-9 Glider Pilots' Individual Training Standard.

(2) 120-1, Combat Cargo Units and Crews.

(3) 120-2, Troop Carrier Units and Crews.

e. Training Circulars.—

(1) 113 (9 October 1943), Employment of Airborne and Troop Carrier Forces.

f. Air Forces Manuals.—

(1) 12, Glider Flying Training.

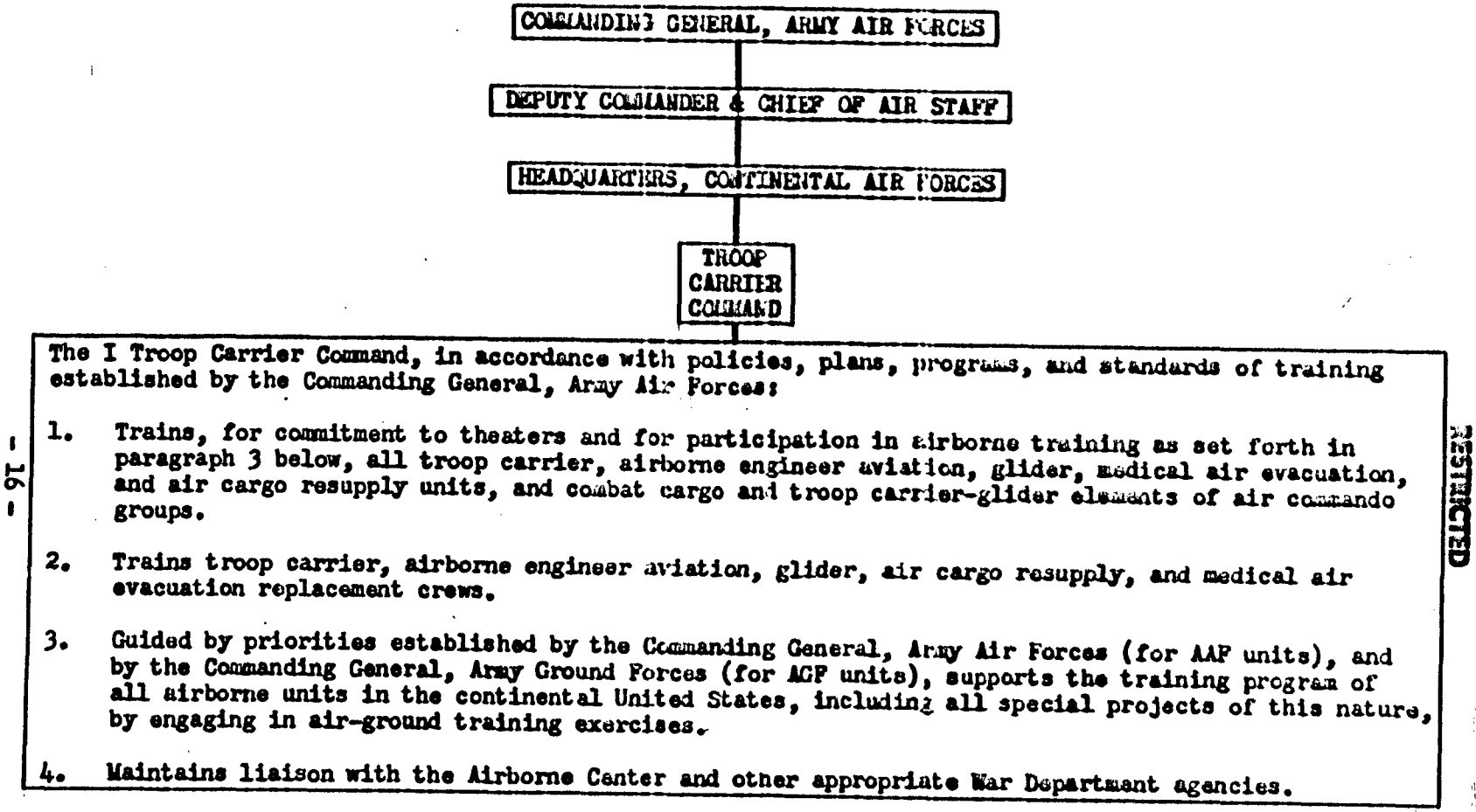
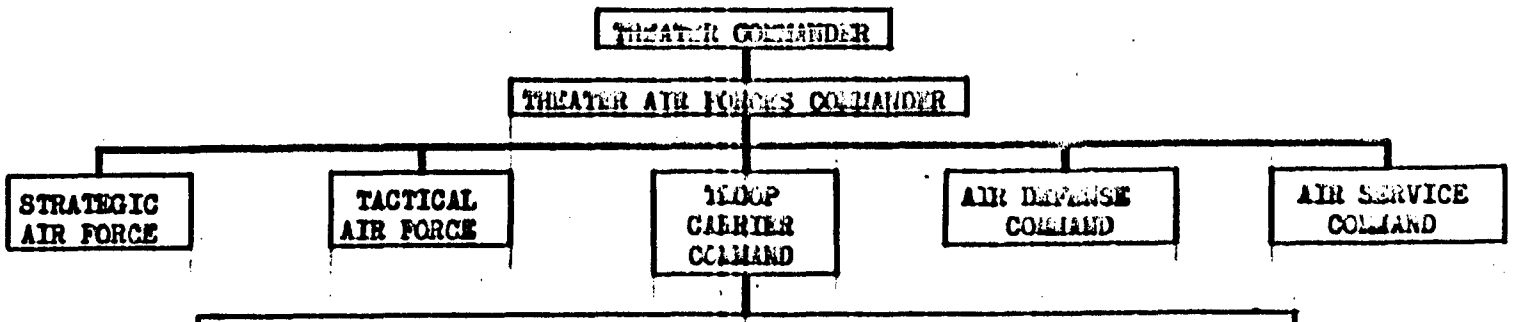


Figure 1.— Troop Carrier Command in Zone of the Interior.



Troop Carrier Command in a Theater of Operations

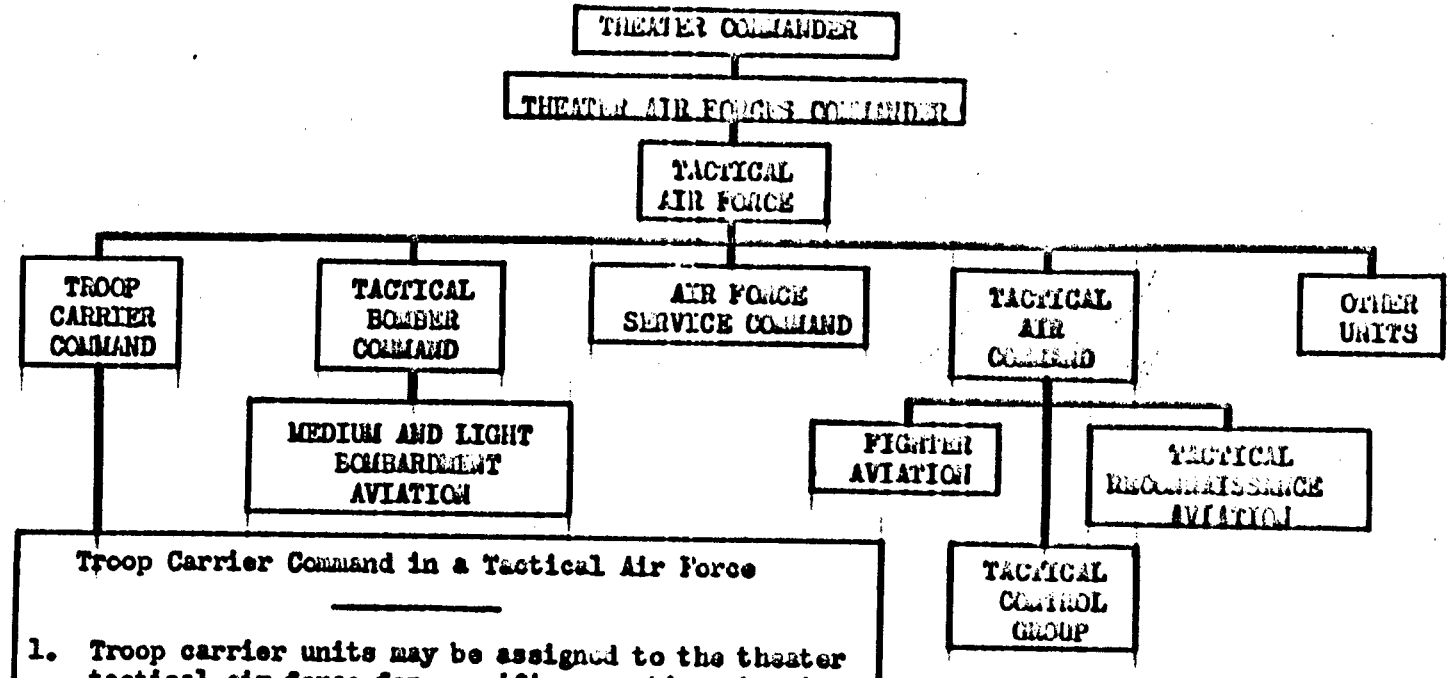
1. Troop Carrier and combat cargo units when assigned to a theater will normally be operated by the theater air forces commander and will constitute the theater troop carrier command.

2. The primary mission of the troop carrier command is to transport troops and equipment into combat, to supply and resupply units in the combat areas, and to retrieve troops and evacuate casualties within forward and combat areas and between such areas and appropriate terminal points.

3. The secondary mission of the troop carrier command is to furnish air transportation of personnel, equipment, and supplies as directed by the theater air forces commander.

4. The troop carrier command, under the theater air forces commander, is the principal agency available to the theater commander in the planning, training, and conduct of combat operations requiring air transportation of troops, equipment and supplies.

Figure 2.— Troop Carrier Command Operating under the Theater Air Forces Commander.



Troop Carrier Command in a Tactical Air Force

1. Troop carrier units may be assigned to the theater tactical air force for specific operations to simplify control and coordination in air-ground or air-ground-naval operations.

2. The mission of the troop carrier command of the tactical air force is to transport troops and equipment into combat, to supply and resupply units in combat areas, and to retrieve troops and evacuate casualties within forward and combat areas. Thus the troop carrier command will participate in the overall mission of the tactical air force in attacking and destroying the enemy armed forces.

Figure 3.— Troop Carrier Command in a Tactical Air Force.

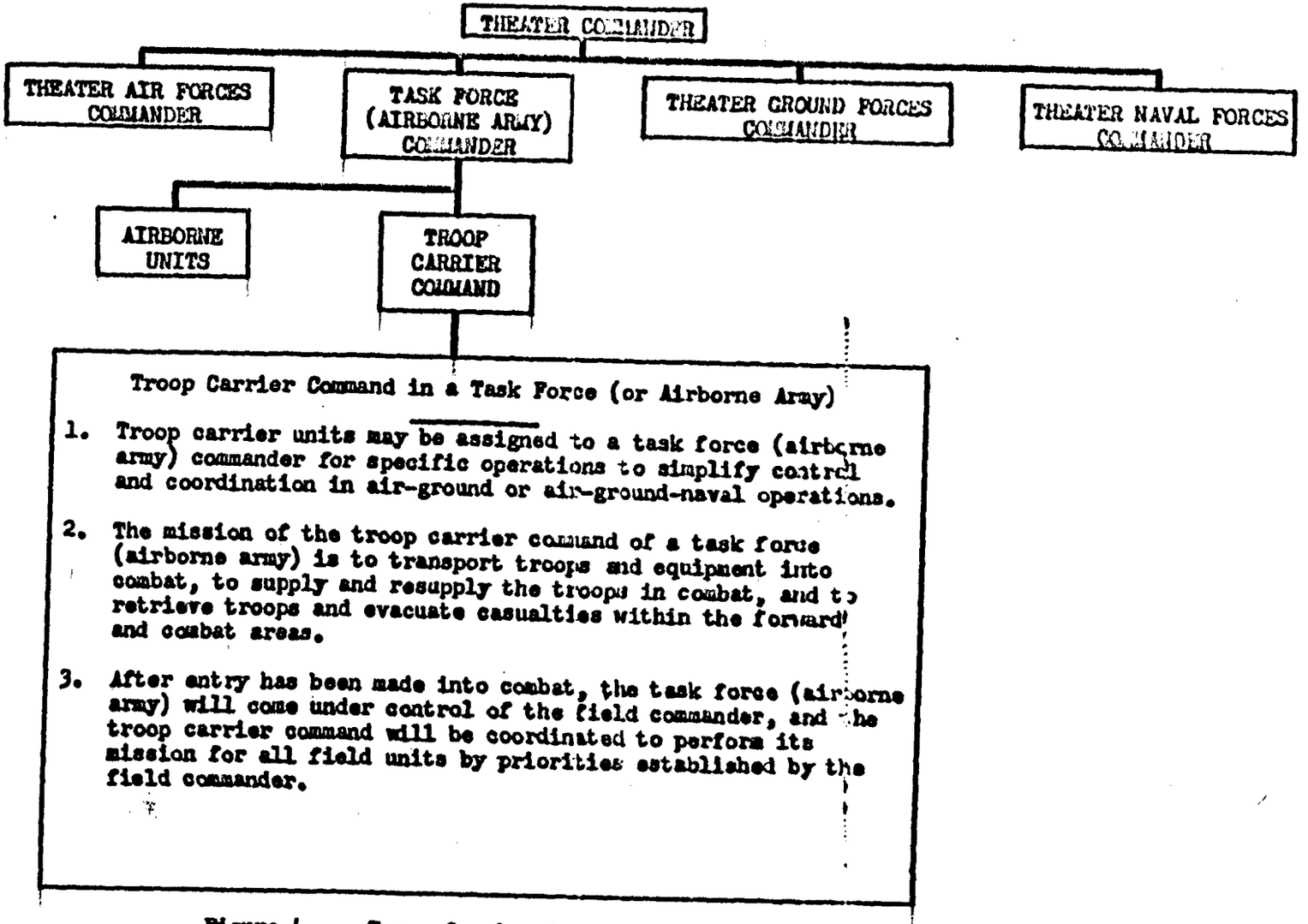


Figure 4.— Troop Carrier Command in a Task Force (or Airborne Army).

CHAPTER 2

PRINCIPLES OF EXPLOSIVES

CHAPTER 2

PRINCIPLES OF EMPLOYMENT

SECTION I

GOVERNING PRINCIPLES

5. GENERAL.— a. The specific missions of troop carrier aviation will vary with the operational doctrine of theater commanders according to the situations existing in the various theaters. Troop carrier units will ordinarily be employed as part of a coordinated effort, and will usually operate in close conjunction with other air, ground, and/or naval forces. It is important, therefore, that higher commanders be familiar with the characteristics and employment of this type aviation. For planning purposes, higher headquarters should include staff personnel with a thorough knowledge of the capabilities and limitations of troop carrier aircraft.

b. Troop carrier aviation is organized and trained for combat operations, and will not be employed for routine transportation when other means are available and adequate.

6. THEATER OF OPERATIONS FORCES.— Troop carrier units are primarily theater of operations forces. Plans for their employment must be initiated by the headquarters having authority to direct the coordinated action of all air, land, and sea forces in the theater. This responsibility should not be delegated to lower headquarters, since positive and complete coordination can be accomplished only by the one headquarters commanding all elements.

7. COMMAND AND COORDINATION CHANNELS.— Ordinarily the channels of command will be those prescribed for routine operations within the theater. During the planning and execution stages of air-ground, air-naval, or air-ground-naval operations, contacts and consultations will be continually maintained by all commanders and staffs concerned. Commanders of troop carrier forces will be authorized to communicate directly with commanders of other forces participating in all phases of the operation.

8. COMBAT TRAINING.— Troop carrier units should not be committed to operations with ground and/or naval forces unless all participating units can be given opportunity and ample time to conduct realistic and thorough joint training. Thorough training in technical aspects is not

sufficient. Training for specific missions must cover all details and contingencies, and should culminate in a rehearsal under conditions closely approximating those of the actual operation. Over-all combat training should be of a nature which will insure smooth and competent procedures in emergency operations. (See chapter 4.)

9. AIR SUPERIORITY.— Air superiority is a fundamental prerequisite for troop carrier operations. As troop carrier aircraft lack armament and are lightly armored if at all, they must depend for protection on fighter escort and evasive tactics such as low-level flying and the cover of darkness. The degree of air superiority which can be attained will be a major factor in determining whether operations should be initiated by day or night.

10. WEATHER.— Both from operational and maintenance aspects, weather is an important factor in troop carrier operations. In case of unfavorable weather conditions, the responsible commander must be prepared to postpone or cancel the air operation. Weather is also a prime factor in logistical planning for supply or resupply operations.

11. BASE AND SUPPLY FACILITIES.— Troop carrier units should be committed to operate only from areas wherein bases are adequate for all participating units. Base areas and supply facilities should be sufficient for the expeditious movement of supplies and for staging and marshalling troop carrier units with other forces employed in the operation. Communications must be positive and well established between the bases from which operations are launched.

12. COORDINATION OF INFORMATION.— It is requisite that all air, ground, and naval units concerned be fully informed as to routes, altitudes, time schedules, and means of identification to be employed in troop carrier operations. This information must be issued in ample time to insure its receipt by all agencies affected by the operation, including isolated antiaircraft units and individual naval vessels, to provide mutual security and to preclude firing on friendly forces.

13. ECONOMY OF FORCE AND MASS.— In combat operations, the principle of economy of force and the principle of mass are applicable to troop carrier aviation. A force adequate to accomplish its mission must be assigned, and sufficient assistance must be given it to contain the enemy during the execution of the mission. The maximum force should be concentrated on the principal objective. Full advantage must be taken of initial surprise by dropping or landing adequate reinforcements and supplies before the enemy can muster his air and ground defenses.

14. LANDING AND DROP ZONES.— Landing and drop zones must be easily identifiable from the air under the expected conditions of visibility. The terrain surrounding these zones should be such as to permit the safe approach and departure of individual aircraft or large formations. Consideration must also be given to the establishment of air fields or landing strips as an early objective in combat operations.

15. SUPPLY AND RESUPPLY.— The employment of troop carrier units for air supply is a proper commitment in periods of emergency. The need for continued air supply operations, however, must be carefully weighed against the availability of troop carrier aviation for the transportation of combat units.

SECTION II

CHARACTERISTICS

16. GENERAL.— A knowledge of the characteristics of troop carrier aviation is essential for sound tactical employment of this aviation. Only when employed to exploit its strongest characteristics and to minimize the effects of inherent limitations can its maximum usefulness be obtained. Not only staff personnel involved in planning troop carrier missions but also all forces participating in or affected by these missions must be thoroughly indoctrinated with the capabilities and limitations of troop carrier airplanes and gliders, in order to insure successful operations.

17. FAVORABLE CHARACTERISTICS.— Favorable characteristics of troop carrier aviation are:

a. Capability of transporting, to any area within operating range, personnel and materiel of air, ground, and naval forces, except items exceeding the weight and bulk capacity of the aircraft.

b. Capability of operating by day or night.

c. Speed and mobility in movement of troops, equipment, and supplies in comparison with other methods of transportation and where other transportation is inadequate or lacking.

d. Capability of effecting surprise.

e. Equipment includes best available airplanes for transporting airborne and other forces.

f. Equipment includes gliders capable of landing in unprepared, restricted areas not suitable for the landing of airplanes.

g. Equipment includes special navigational aids for locating objectives in enemy territory.

h. Equipment includes special means for dropping supplies from airplanes in flight.

i. Equipment includes special means for air evacuation either by landing of aircraft or aerial pickup of gliders.

18. LIMITING CHARACTERISTICS.— Limiting characteristics of troop carrier aviation are:

a. Lack of armament, and limited armor, speed, and range.

b. Dependence for security on fighter escort, low altitudes, route selection, and poor visibility conditions.

c. Difficulties in navigating to specific objectives due to the probable necessity of operating at low altitudes and under conditions of poor visibility.

d. The need of adequate bases with areas suitable for assembling troop carrier and other forces.

e. Dependence on weather as a governing factor in troop carrier employment in coordination with other ground and naval operations.

f. Requirement of partial moonlight for night operations.

g. Limitation in equipment and fire power that can be carried in the aircraft or dropped by parachute.

h. Limitation in the number of troops that can be supplied and resupplied. This factor is dependent upon the number and capacity of available aircraft.

SECTION III

MISSIONS

19. GENERAL.— Because of varying theater requirements, no one type of troop carrier mission should be considered as all-important. Troop carrier units must be prepared to perform any of the following missions, which are listed in order of importance as evidenced in their employment to date.

20. AIRBORNE OPERATIONS.— (For further discussion, see paragraphs 31 to 39.) The mission of troop carrier aviation in airborne operations is to provide air transportation for airborne forces into combat, and to resupply such forces until they are withdrawn or can be supplied by other means. Various phases of troop carrier participation in an airborne operation are:

a. Dropping of parachute troops from airplanes or gliders.

b. Landing of glider-borne troops, equipment, and supplies.

c. Landing of reinforcements, weapons, and heavy equipment by airplanes or gliders.

d. Resupply by free drop, by parachute drop, or by landing of airplanes or gliders.

e. Evacuation of troops and material, including aerial return of casualties, glider pilots, prisoners of war, and, in some instances, all airborne forces when the mission has been accomplished and the forces relieved from combat.

21. AIR LANDING OPERATIONS.— (For further discussion, see paragraphs 40 to 44.) The mission of troop carrier aviation in air landing operations must not be confused with airborne operations, which concerns the air transportation of specially trained units. Air landing operations comprise the delivery of any unit for combat employment either within enemy territory or friendly territory by landing in gliders and/or airplanes. Various phases of troop carrier participation in air landing operations are:

a. Landing of any force.

b. Delivery of equipment, supplies, and reinforcements.

c. Evacuation of casualties and units.

22. COMBAT CARGO OPERATIONS.— (For further discussion, see paragraphs 45 to 49.) Combat cargo operations will ordinarily be performed by

special combat cargo units of troop carrier aviation, but may be performed by any troop carrier unit. These operations include the following principal types, requiring different procedures and technique:

a. Delivery of cargo and reinforcements to ground forces engaged in combat. Methods of supply are by air landing of gliders or airplanes and by dropping.

b. Routine cargo hauling from rear supply bases to advance bases, or between rear bases. This mission will usually be performed entirely by use of airplanes.

23. AIR EVACUATION.— (For further discussion, see paragraphs 50 to 52.) The mission of troop carrier aviation in air evacuation should be coordinated with the delivery of supplies and reinforcements, and will be performed by aerial pickup of gliders or by air landing.

a. Evacuation of personnel.— These operations include:

(1) Evacuation of casualties, coordinated with medical evacuation units and personnel.

(2) Evacuation of units because of combat fatigue or other tactical reasons.

(3) Evacuation of entire forces when their mission has been accomplished and other means of transportation are not available.

(4) Evacuation of prisoners of war and enemy records when other means of transportation are not available or when the information to be obtained is of sufficient importance.

b. Evacuation of material.— These operations include the air evacuation of captured material and of equipment and supplies of friendly forces. Evacuation of material should be coordinated with the service forces involved.

SECTION IV

PLANNING

24. GENERAL.— a. Plans for the commitment of troop carrier aviation with other forces will normally consist of three phases, as follows:

(1) The first phase is that of assault and seizure. This phase will usually be accomplished by troop carrier aviation and airborne forces, with entry into combat by parachutes and gliders, and will be accompanied by isolation of the area of airborne operations through coordination with fighter and bombardment aviation.

(2) The second phase is that of reinforcement and establishment of an air head. This phase will be accomplished by troop carrier aviation and infantry divisions, with entry into combat by gliders and airplanes.

(3) The third phase is that of large-scale exploitation. This phase will be accomplished by troop carrier aviation and corps and army troops, with entry into combat by airplanes.

b. The missions of troop carrier aviation as discussed in Section III of this chapter will cover the employment of troop carrier units in any of the above phases. Theater operations will not necessarily involve all three phases; any one phase may be planned as a separate operation, depending on the situation within the theater.

25. COORDINATION.— a. Plans for the commitment of troop carrier aviation with other forces will be coordinated by higher headquarters.

b. The commanders concerned will plan air-ground, air-naval, or air-ground-naval operations in close cooperation.

c. The responsible air headquarters will thoroughly coordinate any required participation of fighter and bombardment aviation in the troop carrier operation.

d. Plans will also provide for the coordinated dissemination of information to all units participating in the operation or affected thereby.

26. STANDARD OPERATING PROCEDURES.— Standard operating procedures will be established to cover the employment of troop carrier aviation in each type of mission (e.g., airborne, air landing, combat cargo, air evacuation), and will be followed in training, rehearsals, and operations. This method should insure a greater success of the mission and require a shorter time for preparation. (See examples in Appendix.)

27. PROVISION OF AIRCRAFT.— For planning purposes, troop carrier operations must be anticipated far enough in advance to provide sufficient aircraft and to assign adequate bases. Replacements for a maximum attrition rate will be anticipated and provided. If necessary, aircraft will be diverted from other areas or theaters for this purpose.

28. WEATHER.— During the planning phase, weather must be studied with exceptional care. In the event of unfavorable weather, the responsible commander must be prepared to postpone or cancel the air operation.

29. NAVIGATIONAL AIDS.— Plans should include the employment of the following aids to navigation:

a. Selection of objectives and routes to provide the best possible check points.

b. Naval vessels equipped with beacons, radio homing devices, and radar.

c. Pathfinder units placed at the objective before the main flight and equipped with beacons, radio homing devices, radar, and means of marking and lighting the objective.

d. Ground units near the objective equipped with guiding beacons, homing devices, radar, and means of visual signaling.

30. OUTLINE FOR OPERATIONAL PLANNING.— The planning of troop carrier operations must include consideration of the following factors:

a. Mission to be accomplished.

b. Strength, disposition, and capabilities of the enemy.

c. Composition of forces to be employed.

(1) Number of weight of units, equipment, and supplies to be transported.

(2) Number, types, capacity, range, and speed of available airplanes.

(3) Number, types, and capacity of available gliders.

d. Coordination.

(1) Thorough coordination with all participating units of air, ground, and/or naval forces.

(2) Participation of bombardment, fighter, and reconnaissance aviation in the operation.

(3) Coordination with all other air, ground, and naval units within the area covered by the operation.

e. Time required for the air movement.

f. Natural factors.

(1) Light and darkness, including moon phase.

(2) Effect of terrain enroute to and at the destination.

(3) Weather conditions.

g. Pre-flight preparations.

(1) Selection and assignment of departure airdromes.

(2) Assembly of troop carrier units.

(3) Movement of transported units, equipment, and supplies to departure airdromes.

(4) Troop and cargo loading and storage.

(5) Training and rehearsals.

(6) Traffic control.

h. Flight plans.

(1) Routes, altitudes, formations, and timing.

(2) Navigational aids.

(3) Methods of mutual recognition and identification.

(4) Search and rescue coordination.

(5) Diversionary aids.

i. Landing operations.

(1) Sequence of units landing and unloading at objective.

(2) Employment of glider pilots upon landing.

j. Complete signal operation instructions.

k. Resupply and evacuation plan.

l. Alternate or emergency plans for the entire operation.

CHAPTER 3

OPERATIONS

CHAPTER 3

OPERATIONS

SECTION I

AIRBORNE OPERATIONS

31. GENERAL.— a. Doctrine of commitment.— Troop carrier-airborne forces will be committed only when there is a definite requirement for ground action in enemy territory which cannot be accomplished expeditiously or adequately by other ground or naval operations.

b. Organization.— Troop carrier and airborne units will be organized into an integrated task force before being committed to any operation.

c. Employment.— A troop carrier-airborne task force will normally be employed as part of a larger effort, in which its operations will be performed in close coordination with other air, ground, and naval forces. The task force will be employed in mass. The bulk of the force will be landed rapidly in as small an area as practicable, concentrating on the primary objective and taking full advantage of initial surprise.

32. REQUIREMENTS FOR SUCCESSFUL OPERATIONS.— The successful employment of troop carrier-airborne forces will depend largely on the following factors:

a. Achievement of the necessary degree of air superiority.

b. Suitable weather conditions.

c. Suitable objectives within the capabilities of the task force.

d. Sufficient aircraft to transport the troops, equipment, and supplies required to accomplish the mission.

e. Adequate facilities and supplies at points of departure and suitable landing areas near the objective.

f. Capable troop carrier and airborne staff advisers for the task force commander.

g. Sufficient time for thorough planning, coordination, and conduct of specialized training for the operation.

h. Complete and accurate information for advance planning.

i. Employment of navigational aids and pathfinder units.

j. Effective communications between the departure and objective areas.

k. Effective participation of fighter, bombardment, and reconnaissance aviation.

l. Alternate and emergency plans for the operation.

33. CHARACTERISTICS.— A knowledge of the capabilities and limitations of troop carrier-airborne forces is a prerequisite to sound tactical employment of these units.

a. Favorable characteristics:

(1) Wide latitude in selection of suitable objectives.

(2) Capability of striking deeply into enemy territory and exploiting fully the elements of speed and surprise.

(3) Capability of operating by day or by night.

(4) Capability of operating against selected limited objectives within a relatively small area.

(5) Detrimental effect upon enemy morale.

b. Limiting characteristics:

(1) Dependence on favorable weather conditions.

(2) Complexity of staff planning and coordination.

(3) Mobility after landing limited to use of air transported or captured vehicles.

(4) Vulnerability to attack by hostile armored units and to attack by any hostile forces during landing and assembly.

(5) Difficulty in assembly of airborne forces after landing and establishment of command functions.

(6) Limited information with which to operate in strange

(7) Light fire power and lack of equipment for sustained

JTE AND ALTITUDE FACTORS.— The routes and altitudes to be
op carrier aircraft must be carefully selected and coordinated
or elements of the airborne and other participating units.

Routes selected for the troop carrier-airborne operation
val convoys. If this is impracticable, an air lane, not to
naval vessels at prescribed times, must be clearly delineated,
will be of sufficient width to insure the safe passage and
op carrier units.

Routes for troop carrier aircraft will be selected to avoid
fire.

The initial approach to hostile positions should normally
w altitude to prevent early detection.

P ZONE AND LANDING ZONE FACTORS.— The following considera-
fect the selection of drop and landing zones.

Effective photographic coverage provided by reconnaissance
aid materially in selecting the most suitable drop and land-

Drop zones and landing zones must be easily identifiable
nder the expected conditions of visibility. Prominent check
final approach path are desirable.

Drop and landing zones will be sufficiently close to the ob-
omplish surprise.

If enemy strong points are between the drop and landing
objective, the terrain should be such that enemy positions
d.

Cover should be available near the drop and landing zones,
daylight operations.

Terrain should be favorable for defense against armored at-

Airborne units must have a reasonable chance of being
ffective command control before entering combat.

Pathfinder units will be employed when necessary for tactical
sion will be made for early landing units to mark the land-
ter flights.

i. Alternate drop and landing zones will be selected, so that subsequent serials can be diverted if the initial zones prove to be heavily defended or otherwise unsatisfactory.

36. MISSIONS.— Troop carrier-airborne missions will constitute an integral part of the basic theater plan. These forces may be employed as the assault phase or separate phase of an operation as follows:

a. To seize, hold, or otherwise exploit important tactical localities in conjunction with or pending the arrival of other military or naval forces.

b. To attack the enemy rear and assist a break-through or landing by the main force.

c. To block or delay enemy reserves by capturing and holding critical terrain features, thereby isolating the immediate battlefield.

d. To capture enemy airfields.

e. To capture or destroy vital enemy [illegible] thereby disrupting his system of command, communications, and supply.

f. To create diversions.

g. To assist in delaying a retreating enemy until the main forces can destroy him.

h. To reinforce threatened or surrounded units.

i. To seize islands or areas which are not strongly defended and which the enemy cannot easily reinforce.

j. To create confusion and disorder among hostile military forces and civilians.

k. To assist in the conduct of partisan warfare in enemy occupied territory.

l. To provide a constant threat by their mere presence in the theater of operations, thereby causing the enemy to disperse his forces over a wide area in order to protect vital installations.

37. TIME TO INITIATE OPERATIONS.— a. Troop carrier-airborne forces must be prepared to operate by day or night, since no invariable time can be prescribed for such operations.

(1) When operating in conjunction with ground forces only, the time of attack will be coordinated to give maximum assistance to the main effort.

(2) When operating in conjunction with amphibious forces, the time of attack may precede or occur simultaneously with the assault of the amphibious force.

(3) Where the proper conditions exist, daylight attacks are preferable.

(4) Daylight landings in conjunction with opportune use of smoke will combine some of the advantages of both day and night operations.

b. Troop carrier-airborne operations carried out at night have the following advantages:

(1) Chances of surprise are greatly increased.

(2) Attack by enemy aircraft during the air movement is less likely.

(3) Aircraft and personnel are less vulnerable to enemy fire.

(4) Final preparations for takeoff can be concealed from the enemy.

c. Operations at night have the following disadvantages:

(1) A much higher degree of training is required for pilots and airborne troops.

(2) Operational difficulties must be overcome in assembling into large formations, in navigating, in landing, and in regaining command control of transported units after landing.

(3) Accurate mass landings are not feasible unless a quarter-moon or better is assured.

d. In some instances, a combination of a night takeoff and a dawn or daylight landing, or of a daylight takeoff and a dusk or night landing, will be a proper compromise.

38. PLANNING AND COORDINATION.— a. Command and liaison.— Troop carrier and airborne commanders will mutually develop detailed plans for the concentration of troops, the air movement, the tactical operation at the objective, resupply, and evacuation. The commanders will exchange liaison personnel. Continuous contact will be maintained among the commanders and their staffs during the planning and execution stages of the operation. Higher headquarters will coordinate the troop carrier-airborne operation with all units affected thereby.

b. Direct channels of communication.— Commanders of troop carrier and airborne units will be authorized to communicate directly in all phases of planning and execution. These direct channels are especially vital during the operation, so that alternate or emergency plans can be put into effect to meet any change in the ground situation.

c. Standard operating procedure.— A troop carrier-airborne standard operating procedure will be developed and followed for training and combat operations to insure greater flexibility and speed of employment. (See example, Appendix I.)

d. Outline for operational planning.— The planning of troop carrier-airborne operations will include consideration of the factors listed in paragraph 30.

39. EXECUTION.— a. Responsibilities of higher headquarters.— (1) All units in the area of operations will be informed of scheduled troop carrier-airborne missions. Procedures will be prescribed which will insure that troop carrier aircraft will not be fired upon by friendly forces and that all units are instructed as to their common responsibility of recognizing friendly troop carrier formations.

(2) During air movement and landings at night, care will be exercised to insure that military and naval bombardment will not so illuminate the ground by explosions and fires, with resultant dust and smoke, that recognition of routes and landing areas becomes impossible.

(3) Troop carrier and airborne units will be advised of the means of recognition and identification used by the ground forces with whom they may operate. Establishment of a common countersign for all troops is essential.

b. Joint responsibilities of troop carrier and airborne commanders.—

(1) Coordination of troops and aircraft departing from specific bases.

(2) Establishment of control parties at departure air bases.

(3) Supervision of loading of troops, equipment, and supplies.

(4) Selection of drop zones and landing zones.

(5) Arrangment for control parties at drop and landing zones.

(6) Proper provision for unloading of aircraft at the destination.

(7) Planning and supervision of resupply and evacuation.

c. Responsibilities of troop carrier commander.— Since the air movement is essentially an air operation, the delivery of airborne troops to their destination is the responsibility of the troop carrier commander. He will perform the following duties:

(1) Designation of the use and allocation of troop carrier units in a manner as favorable to the requirements of the airborne commander as tactical and technical conditions permit.

(2) Designation of aircraft departing from specific bases.

(3) Inspection of loads.

(4) Preparation and supervision of all details of the air movement, including times, routes, altitudes, speed, formations, rendezvous, check points, use of navigational aids, and other means of regulating the flight to the objective.

(5) Arrangement for withdrawal of troop carrier personnel after reaching the objective.

(6) Accomplishment of resupply and evacuation missions.

d. Responsibilities of airborne commander.— (1) Assembly of airborne troops, equipment, and supplies at departure air bases.

(2) Supervision of loading of equipment into airplanes and gliders.

(3) Preparation of tactical plan for the ground operation after landing.

(4) Determination of the ground mission to be performed by glider pilots after landing and pending evacuation.

(5) Establishment of resupply requirements and arrangement for delivery of supplies to departure air bases.

e. Retention of initiative.— After the airborne operation has begun, it is most important that the initiative be retained. Adequate reinforcements and supplies must be delivered to exploit the initial surprise before the enemy can organize his defenses in full force. Forward and rear command echelons composed of troop carrier and airborne personnel will be established with authority to communicate direct, thus assuring rapid changes in plans to meet the changing ground situation.

f. Airborne tactics and technique.— For tactics and technique of airborne forces, see FM 31-30.

SECTION II

AIR LANDING OPERATIONS

40. GENERAL.—a. The doctrine presented in Section I of this chapter, in so far as it is applicable, will govern the employment of troop carrier aviation in air landing operations.

b. In some instances the first phase of an operation, that of assault and seizure (see paragraph 24), may be accomplished partially or entirely by air landing of units other than airborne forces. Normally, the second and third phases, those of reinforcement and large-scale exploitation, will be carried out by air landing of infantry and other troops.

c. Air landing operations will not be performed where movement of ground units can be made adequately and more economically by other means.

d. Air landing operations will be performed only where landing areas are not in enemy possession.

41. CHARACTERISTICS.—Air landing operations are limited only by the number of available troop carrier units, the load capabilities of the aircraft, and the availability of adequate air bases or landing strips at the departure and landing areas.

42. MISSIONS.— The missions of air landing forces will constitute an integral part of the basic theater plan. These missions are:

a. The same as troop carrier-airborne missions when air landing forces are used as assault units (see paragraph 36).

b. Reinforcement of airborne troops previously committed, in order to exploit the success attained.

c. Reinforcements, where landings are possible, of threatened or surrounded units.

d. Reinforcement of rapidly penetrating armored units.

e. Reinforcement of partisans in hostile areas.

f. Reinforcement of front line units where other means of transportation are inadequate.

43. PLANNING AND COORDINATION.— a. Command and liaison.— Detailed plans and liaison activities for an air landing operation will be accomplished as discussed in paragraph 38, with the senior commander of the transported units assuming the functions described therein for the airborne commander.

b. Direct channels of communication.— Direct communication will be authorized between forward and rear bases through control parties and between troop carrier and transported unit commanders.

c. Assembly and training.— Special care must be taken to provide sufficient time for the assembly of troop carrier and air landing units at the departure air bases. A short period of training will be necessary to indoctrinate the transported units in loading and unloading procedures.

d. Supply and evacuation.— Plans for supply and evacuation will be coordinated and priorities established by the senior commander of the air landing units in consultation with the troop carrier commander.

e. Standard operating procedure.— A standard operating procedure for air landing operations will be developed by the troop carrier commander and will be used in training and operations to enable the accomplishment of such missions on short notice. (See example, Appendix II.)

f. Outline for operational planning.— The planning of air landing operations will include consideration of the factors listed in paragraph 30.

44. EXECUTION.— Responsibilities for the successful accomplishment of an air landing operation will be the same as those set forth in paragraph 39, with the senior commander of the transported units taking over the duties described therein for the airborne commander.

SECTION III

COMBAT CARGO OPERATIONS

45. GENERAL.— Combat cargo units are components of troop carrier aviation specially organized and trained as carriers of cargo and personnel in the combat zone. These units are principally employed in supply and reinforcement by air of units engaged in combat where no other adequate means of transportation are available. Such special units may be profitably employed in theaters or remote combat areas where no troop carrier command exists. In addition to their specialized functions, combat cargo units may be utilized for all other types of troop carrier and cargo operations needed in the theater.

46. CHARACTERISTICS.— Combat cargo operations are limited by availability of air bases, cargo carrying capacities or available aircraft, enemy air action, weather, and range.

47. MISSIONS.— Combat cargo missions include the following:

a. Air transportation of ground troops and auxiliary equipment to effective locations in the combat zone.

b. Supply and reinforcement by air of isolated ground or air forces. Supply will be effected by parachute drop, free drop, or air landing.

c. Supplemental supply and reinforcement by air of front line or advance units until other transportation is adequate. Supply will be effected by dropping or landing. Because of losses experienced in dropping, delivery of supplies will be accomplished by landing of gliders or airplanes wherever possible.

d. Air evacuation of casualties and other personnel and material from the combat zone.

e. Air service between rear bases. Combat cargo and other troop carrier units will be employed for this purpose only where other means of transportation are inadequate. Combat operations of troop carrier aviation will always have precedence over routine functions. When employed in transportation service in rear areas, combat cargo and other troop carrier units will be rotated, and command responsibilities for these units will be retained by the troop carrier commander. Such service consists of transportation of personnel, supplies, and mail.

(1) Scheduled runs will be maintained, and coordination with air base commanders will be effected.

(2) Traffic control will be maintained by air base commanders through the service forces involved.

(3) Combat cargo and other troop carrier units employed in this type of operation will be relieved in ample time to prepare for any other tactical operation in which their participation is required.

43. STANDARD OPERATING PROCEDURE.— Troop carrier forces will develop a standard operating procedure for air supply operations. This procedure will be followed by combat cargo and other troop carrier units in training and operations to insure readiness at all times to meet emergencies. (See example, Appendix III.)

49. REFERENCES.— For detailed information on air supply, see FM 31-40, Transportation of supplies by air. For logistical data, see FM 101-10, Organization, technical and logistical data.

SECTION IV

AIR EVACUATION

50. GENERAL.— a. The mission of troop carrier aviation in air evacuation will usually be an integral part of other planned operations. The need for evacuation of casualties and combat units must be considered in all operations in order to secure the maximum usefulness of troop carrier aircraft.

b. It is the responsibility of the theater commander or task force commander to coordinate the employment of troop carrier forces with the requirements of field commanders and medical units for air evacuation.

51. MISSIONS.— There are five principal types of air evacuation missions, as follows:

a. Evacuation of casualties.— This type of air evacuation mission is extremely important in saving manpower, with its inherent advantages of ease and speed in moving casualties from the forward area to rear bases. It is also a great morale factor among combat troops. This operation will normally be performed by troop carrier units in conjunction with medical air evacuation units. The planning of such operations will be jointly accomplished by the troop carrier, field, and medical commanders involved. Requirements for evacuation will be included in all plans for troop carrier operations. Evacuation of casualties will be effected by aerial pickup of gliders or by landing of airplanes.

b. Evacuation of combat units.— (1) Air evacuation of combat units will usually be an emergency operation, necessitated by a change in the ground situation in which units are trapped or some similar predicament exists and in which air transportation offers the only means of removal.

(2) Evacuation in such instances will take on the aspects of an air landing operation, for which the doctrine presented in Section II of this chapter will apply. Conduct of the operation will be a joint responsibility of the troop carrier and field commanders.

(3) At other times, troops and equipment which must be evacuated to the rear for command, rest, or repair purposes may be transported in troop carrier aircraft. These operations must be coordinated with supply and other evacuation missions. It will be the responsibility of of the field commander to establish priorities for this traffic.

c. Evacuation of glider pilots and other troop carrier personnel.— In all combat operations involving the employment of glider pilots and other troop carrier personnel, it is the responsibility of the troop carrier commander to arrange for their early evacuation. Plans for their evacuation will be a part of the overall plan covering the operation. Evacuation will be effected by aerial pickup of gliders, landing of airplanes, or surface transportation, and must be coordinated with all agen-

cies involved.

d. Evacuation of prisoners of war.— This type of mission will be performed when other means of evacuation are not available or when prisoners are urgently needed for interrogation.

e. Evacuation of material.— (1) During the planning phase of any troop carrier operation, plans will be made to reclaim all aircraft and equipment used in the operation. This is a function of the air service command, but it is the responsibility of the troop carrier commander to coordinate these activities with the air service command and commanders of other forces involved. Evacuation will be effected by aerial pickup, towing from prepared air strips, or disassembly and movement by surface transportation.

(2) Troop carrier and ground force commanders will accomplish joint measures to protect aircraft and equipment from being stolen, injured, destroyed, or cannibalized.

(3) Air evacuation of captured material will be performed by troop carrier aviation in coordination with other evacuation missions.

52. STANDARD OPERATING PROCEDURE.— Troop carrier forces will develop a standard operating procedure for air evacuation operations. This procedure will be followed in training and air evacuation missions. (See example, Appendix II.)

SECTION V

SPECIAL TASK FORCES

53. GENERAL.— Troop carrier aviation may be required as part of special air task forces organized for specific missions. Such task forces will vary in size and organization up to and including an airborne army, depending on the mission to be performed.

54. COMMAND AND ORGANIZATION.— a. Troop carrier units may be an integral part of the air task force or may be attached in quantity as required. In either case, command of the troop carrier units will be exercised by the air task force commander until the completion of the mission, when the units will normally return to the control of the troop carrier commander.

b. Air task forces are organized to provide the greatest amount of flexibility in employment. An example of such an organization is an air commando group, which contains a troop carrier squadron as an integral part of its organization.

c. An airborne army is organized for large-scale airborne operations, and will be employed as directed by the teater commander. The airborne army commander will exercise operation control of all assigned or attached troop carrier units.

55. EMPLOYMENT.— Employment of troop carrier units in special air task forces or in an airborne army will follow the principles and doctrine presented in Chapter 2 and in preceding sections of this chapter, depending on the specific mission of the task force or army.

CHAPTER 4

TRAINING

CHAPTER 4

TRAINING

56. GENERAL.— a. Phases of training.— Training of troop carrier units is divided into three phases: individual training, unit training, and training with ground, naval, and other air units. A high state of proficiency is required for troop carrier units to perform their various missions. Careful consideration will be given to the time allotted and to the use made of this time in order to maintain the requisite high standards. Continuous training will be conducted in theaters of operations during periods when the units are not engaged in combat operations.

b. Governing principles.— (1) Troop carrier units will be indoctrinated with the teamwork required for the accomplishment of any mission. This principle of close cooperation is necessary to secure the air and ground discipline required for this highly specialized use of aviation.

(2) Whenever practicable, troop carrier units will be rotated in operational assignments to obtain an equal level of proficiency on the part of all individuals and units.

(3) Troop carrier units will be employed intact in training and in combat operations. This principle applies to all personnel and units, including complete glider echelons to be maintained intact for assignment in training and combat employment.

57. INDIVIDUAL TRAINING.— a. General requirements.— Individual training will normally be completed by troop carrier personnel while in training centers and in the training command. Advanced tactical training for individuals may be continued by the troop carrier commander. Individual training in theaters will be maintained to a sufficient extent to insure a high standard of individual proficiency. Reference is made to the pertinent "90" and "120" series, AAF training standards.

b. Special training.— The troop carrier commander is responsible for the individual training necessary for the successful accomplishment of any specific mission. This responsibility will apply to the training required for operating any special equipment used in the mission, such as pathfinder equipment, navigational aids, and glider tow and glider pickup equipment.

58. UNIT TRAINING.— a. General requirements.— To be able to perform assigned operational missions, troop carrier units must comprise closely knit, well organized teams of highly trained specialists of both air and ground echelons. Unit staffs must be thoroughly trained in the planning or all details incident to operational missions, including a close acquaintance with the organization, tactics, technique, and logistics

of both air and ground forces. Troop carrier units must be capable of flying from the zone of the interior to theaters of operations, and will be proficiant in formation flying by day and night with or without glider tow. They will be skilled in takeoffs and landings on improvised strips with runways of minimum length and under crosswind conditions. Particular reference is made to AAF Training standard 120-2.

b. Administrative and technical training.— A thorough knowledge of the administrative and technical duties of troop carrier units is required for all assigned personnel, in order to operate successfully with other units, with task forces, or separately, and to maintain aircraft and equipment in condition for combat employment.

c. Tactical training.— Tactical training of troop carrier units in all operational techniques must be conducted thoroughly and continuously to maintain the units in the requisite state of proficiency for commitment to combat missions, either day or night, on short notice. Standard operating procedures for both training and combat employment will be accomplished and complied with by all units.

59. TRAINING WITH OTHER UNITS.— a. General requirements.— Training with ground, naval, and other air units is a prerequisite for successful tactical air operations and should be provided for all units of troop carrier aviation.

b. Training in zone of the interior.— Prior to departure for theaters of operations, all troop carrier units will carry out training with other air and ground units in tactical maneuvers simulating combat conditions. This training will include naval units when necessary for practice in amphibious operations.

c. Training in theaters of operations.— Troop carrier units will be given ample time to conduct training with all other units involved in contemplated operations. This training will culminate, when practicable, in a full-scale rehearsal of the pending operation. Training carried out in conjunction with fighter escort and smoke-laying aircraft is particularly important for successful troop carrier operations.

APPENDICES

Note.— The following appendices are included merely as examples of standard operating procedures for typical troop carrier operations, and are not to be mistaken for established doctrine or the final word on the subject. Troop carrier commanders will formulate and issue their own standard operating procedures for the units under their command. The attached appendices, however, may be helpful for illustrative purposes.

APPENDIX I

SOP, TROOP CARRIER-AIRBORNE OPERATIONS

RESTRICTED

APPENDIX I

HEADQUARTERS
___ TROOP CARRIER COMMAND

Place _____

EMORANDUM)
:
IO. ___)

Date _____

STANDARD OPERATING PROCEDURE
FOR TROOP CARRIER-AIRBORNE OPERATIONS

1. PURPOSE:

To establish uniform methods of training and operations throughout all assigned troop carrier units for participation in troop carrier-airborne operations.

2. COORDINATION.

a. Directive.— (Reference to directive issued by higher headquarters covering proposed operations.)

b. Liaison.— Upon receipt of directive or order to participate training and combat missions, commanders of troop carrier units will mediately establish liaison with airborne units as indicated in the directive or order from higher headquarters.

3. BRIEFING.

a. Thorough use of photos, maps, charts, and terrain models will made in briefing.

b. In addition to normal briefing, troop carrier personnel will responsible for briefing airborne personnel in emergency and ditching ocedures.

c. Commanders of glider units will be responsible for briefing ider personnel in the ground operations of the airborne units after nding.

4. PARATROOP MISSIONS.

a. Loading.—

(1) The loading of airplanes will be accomplished in accordance with directive of higher headquarters.

(2) Care will be exercised not to exceed safe limits of CG travel in loading all airplanes. Loading and lashing will be accomplished by airborne personnel in presence of the pilot and co-pilot of each airplane.

b. Marshaling, takeoff, and assembly.—

(1) Airplane marshaling, takeoff, and assembly will be performed by troop carrier units in accordance with standard procedures established for each airfield.

(2) Emergency procedures will be established for each airfield to take care of abortives.

c. Formation.— The twelve airplane diamond of vees will be the standard paratroop formation. (See figure 1.)

d. Altitude and route.—

(1) The altitude for the flight on course will be between 1000 and 1500 feet with a normal jump altitude of 600 feet.

(2) The route will be in conformity with the directives of higher headquarters.

e. Jump signal.—

(1) Night signal:

(a) Five minutes out from the DZ, the group leader will give the preparatory order, "Ready with the red". The radio operator will then attach the red filter to the Aldis lamp (C-3 signal lamp) and take up position in the astrodome.

(b) Four minutes out from the DZ, the group leader will give the order, "Show the red." The radio operator, pointing the Aldis lamp to the rear through the astrodome, will turn on the lamp and swing the red beam slowly to the right and left five times, through approximately 60 degrees.

(c) The red signal will be repeated by the lead airplane of each squadron in the group.

(d) The group leader will then give the order, "Ready with the green," and the radio operator will attach the green filter to the Aldis lamp.

(e) Upon reaching the jump point, the group leader will give the order, "Show the green." The radio operator, pointing the Aldis lamp to the rear through the astrodome, will turn on the lamp and swing the

green beam slowly to the right and left five times, through approximately 60 degrees.

(f) The green signal will be repeated by the lead airplane of each squadron in the group when the jump point is reached.

(2) Day signal:

(a) A warning signal will be given by the group leader wagging wings with ailerons and repeated by the squadron leaders just prior to arrival at the DZ.

(b) The group and squadron leaders will give the internal airplane jump signal as they reach the jump point, with pilot of each airplane repeating the signal upon leader's jump.

f. Return of airplanes.—

(1) The altitude and route of returning airplanes after the drop has been made will be in conformity with directives of higher headquarters.

(2) Landings will be made in compliance with established procedures at each airfield.

5. GLIDER MISSIONS.

a. Loading.—

(1) The loading of gliders will be accomplished in accordance with directives of higher headquarters.

(2) Care will be exercised not to exceed safe limits of CG travel in loading of all gliders. Loading and lashing will be performed by airborne personnel in presence of the pilot and co-pilot of each glider. Load manifests will be accomplished by senior airborne passenger and will be verified and signed by the glider pilot and tow pilot.

b. Marshaling, takeoff, and assembly.—

(1) Towship-glider marshaling, takeoff, and assembly will be performed by troop carrier units in accordance with standard procedures prescribed for each airfield.

(2) Emergency procedures will be established for each airfield to take care of abortives.

c. Formation.—

(1) The formation enroute to the LZ may be a column of two or four airplanes, single tow, elements, or a column of one or two airplanes, double tow, elements. (See figures 2 to 5.)

(2) If the four airplane, single tow element or the two airplane, double tow element is flown enroute, the formation will be split into two columns of two airplane, single tow elements or one airplane, double tow elements, not less than three minutes from the actual release point to permit left-hand patterns for all glider landings.

d. Altitude and route.—

(1) The altitude for the flight on course will be between 1000 and 1500 feet, with an altitude of 600 feet being used for the final run in to the release points.

(2) The route will be in conformity with the directives of higher headquarters.

e. Glider release signal.—

(1) Night signal: Visual signals will be executed for release as outlined in paragraph 4e(1).

(2) Day signal: Visual signals will be executed for release as outlined in paragraph 4e(2).

(3) Intercommunication between glider and towship will be established on all operational flights and employed to confirm arrival at release point.

(4) Release will be made by glider pilots.

f. Landing.—

(1) Responsibility for recognition of LZ and for release will be placed on the glider pilot leader of each squadron. All other glider pilots of the squadron will release on him.

(2) The leader will select and commit gliders of his squadron to a field in the LZ (the first available to effect saturation), and all glider pilots of the squadron will follow him in pattern dispersing to the right for landing.

(3) Minimum safe gliding speed will be executed in approaches and landings.

(4) Emergency landing procedures will be established.

g. Employment of glider pilots after landing.—

(1) While landings are in progress, glider pilots will assist airborne glider commanders in field control of airborne personnel to insure that landing areas will be clear of equipment and personnel for subsequent landings.

(2) Immediately upon landing, glider pilots will assist in unloading and movement of the supplies in their respective gliders. If contact is made with the enemy upon landing, all personnel will take cover and neutralize enemy action before unloading heavy equipment and supplies.

(3) Glider pilots will proceed with transported troops to the assembly areas and then to battalion or regimental command posts. Senior glider pilots will form provisional organizations of glider pilots for purposes of control and possible tactical employment as infantry. Having determined the number of glider pilots and the nature and type of equipment on hand, senior glider pilots will report to senior airborne commanders at appropriate command posts for instructions.

(4) During ground operations with airborne units, glider pilots will be available under the senior airborne commander for the performance of necessary duties, including the defense of command posts, guarding or evacuation of prisoners of war, and clearing and preparation of landing areas if subsequent glider landings are contemplated. Unusually hazardous missions or such duties as would disperse pilots so as to prohibit rapid assembly for evacuation will not be assigned except in cases of extreme emergency.

6. RESUPPLY MISSIONS.

a. Dropping.—

(1) Dropping supplies by parachute or free drop when performed in mass will be in accordance with procedure established in paragraph 4 for paratroop drop.

(2) When supplies are dropped from airplanes towing gliders, airplanes will proceed from glider release point to designated drop zone and follow procedure outlined in paragraph 4e.

(3) When more than one pass is necessary to drop supplies,

the procedure as outlined in paragraph 4 will apply except that serials will be restricted to maximum of 12 airplanes. Upon arrival at the DZ, a pattern will be established to permit safe passage of airplanes over the DZ as necessary to deliver all supplies.

b. Resupply by glider.— The procedure as outlined in paragraph 5 will apply.

c. Resupply by landing airplanes.—

(1) In addition to loading of airplanes, the senior airborne commander will be responsible for unloading supplies at destination.

(2) Formations will be restricted to the size that can be adequately handled at destination without congesting the landing field.

7. EVACUATION MISSIONS.

a. Coordination.— All evacuation missions will be coordinated with resupply missions whenever possible.

b. Glider pilots.— Plans for the early and expeditious evacuation of glider pilots will be an integral part of the over-all plan for the airborne operation. Evacuation may be effected by:

(1) Overland means as soon as lines of communication are established.

(2) Aerial pickup, coordinated to effect reclamation of equipment.

(3) Air landing.

c. Casualties and troops.— Troop carrier participation in evacuation of casualties and troops will be coordinated with the medical evacuation units involved and will be effected by aerial pickup of gliders and landing of airplanes.

d. Gliders and equipment.— Reclamation of gliders and equipment will be coordinated with the service units responsible for salvage and will be effected by aerial pickup and by air landing and towing of gliders from landing strips.

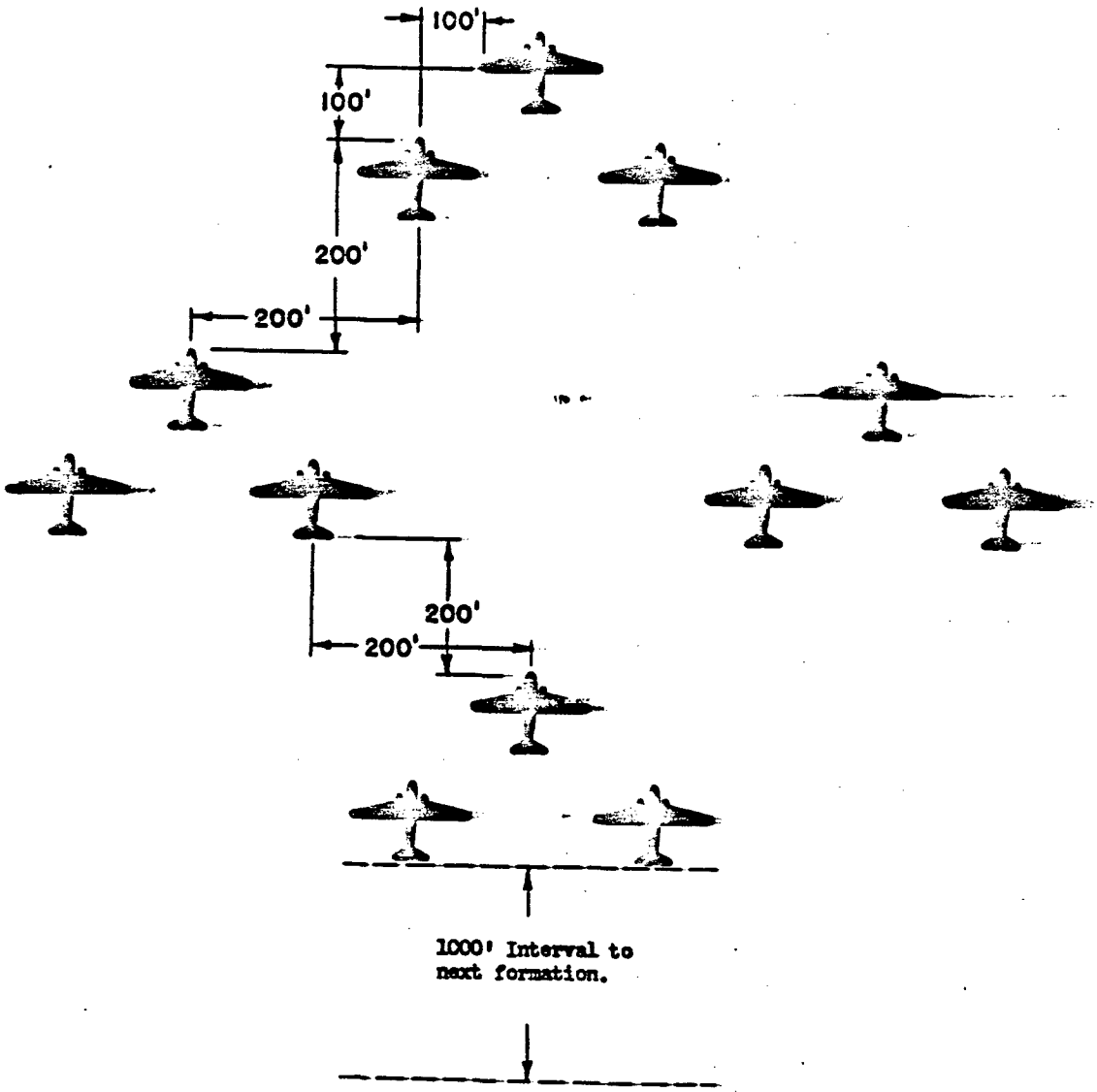
8. TROOP CARRIER FORWARD ECHELON.

a. A troop carrier forward echelon will be organized for each airborne operation, composed of signal and liaison personnel and attached to the advance headquarters of the airborne force.

b. The troop carrier forward echelon will be transported in gliders and will land with airborne advance headquarters in order to:

(1) Establish direct communication with troop carrier command rear headquarters.

(2) Coordinate subsequent missions, such as subsequent glider landings, resupply, and evacuation.



A 12-Ship diamond of Vees will be the standard paratroop formation.

FIG. 1 - PARATROOP FORMATION

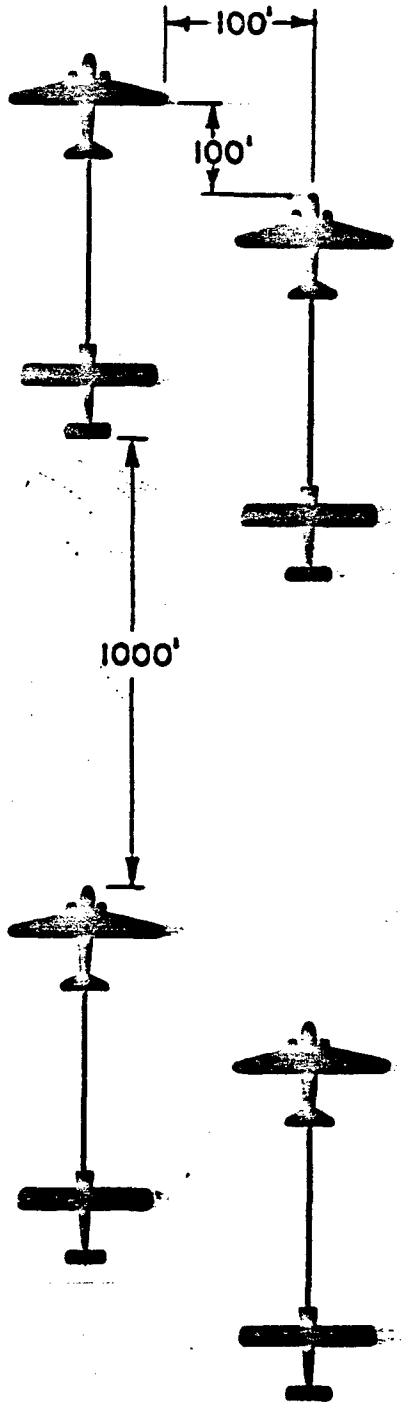
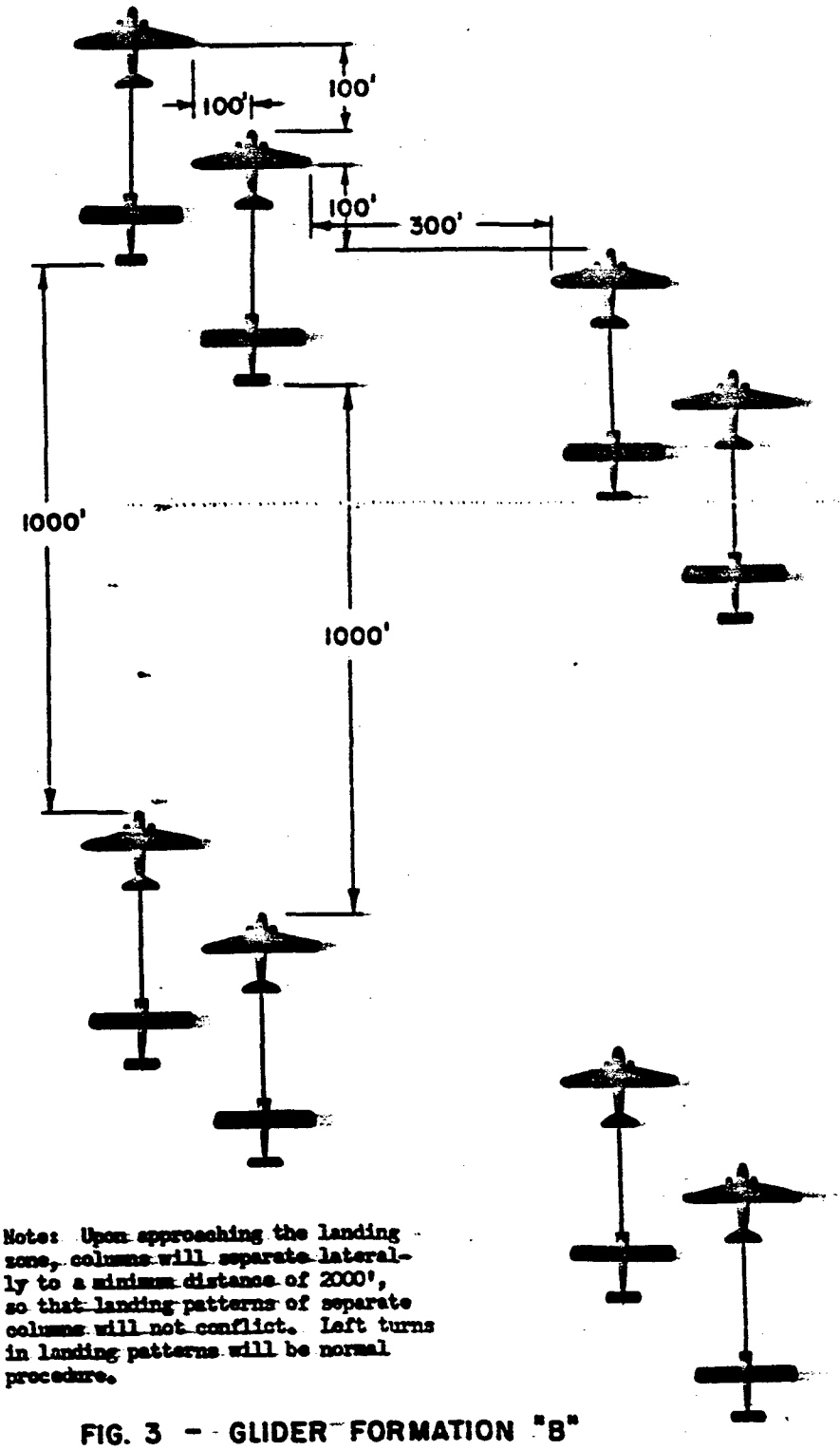


FIG. 2 - GLIDER FORMATION "A"



Note: Upon approaching the landing zone, columns will separate laterally to a minimum distance of 2000', so that landing patterns of separate columns will not conflict. Left turns in landing patterns will be normal procedure.

FIG. 3 - GLIDER FORMATION "B"

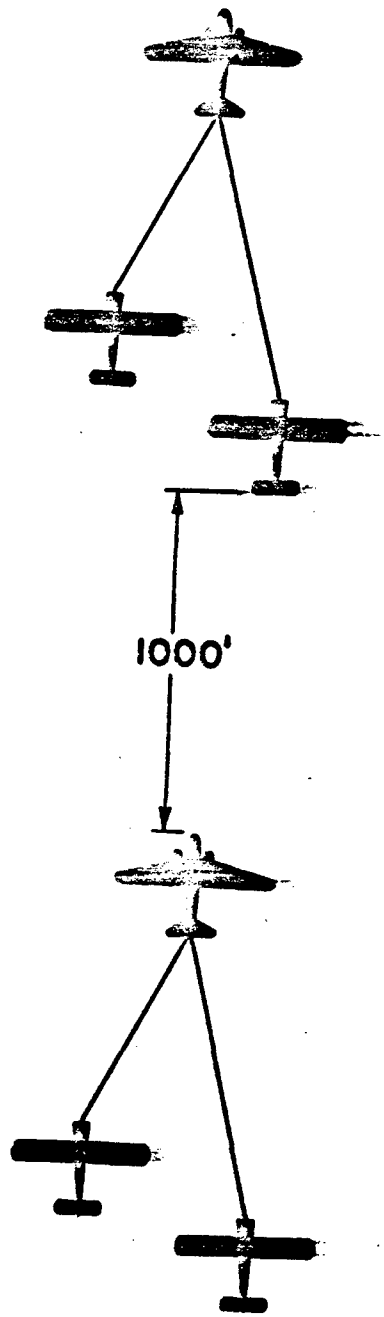
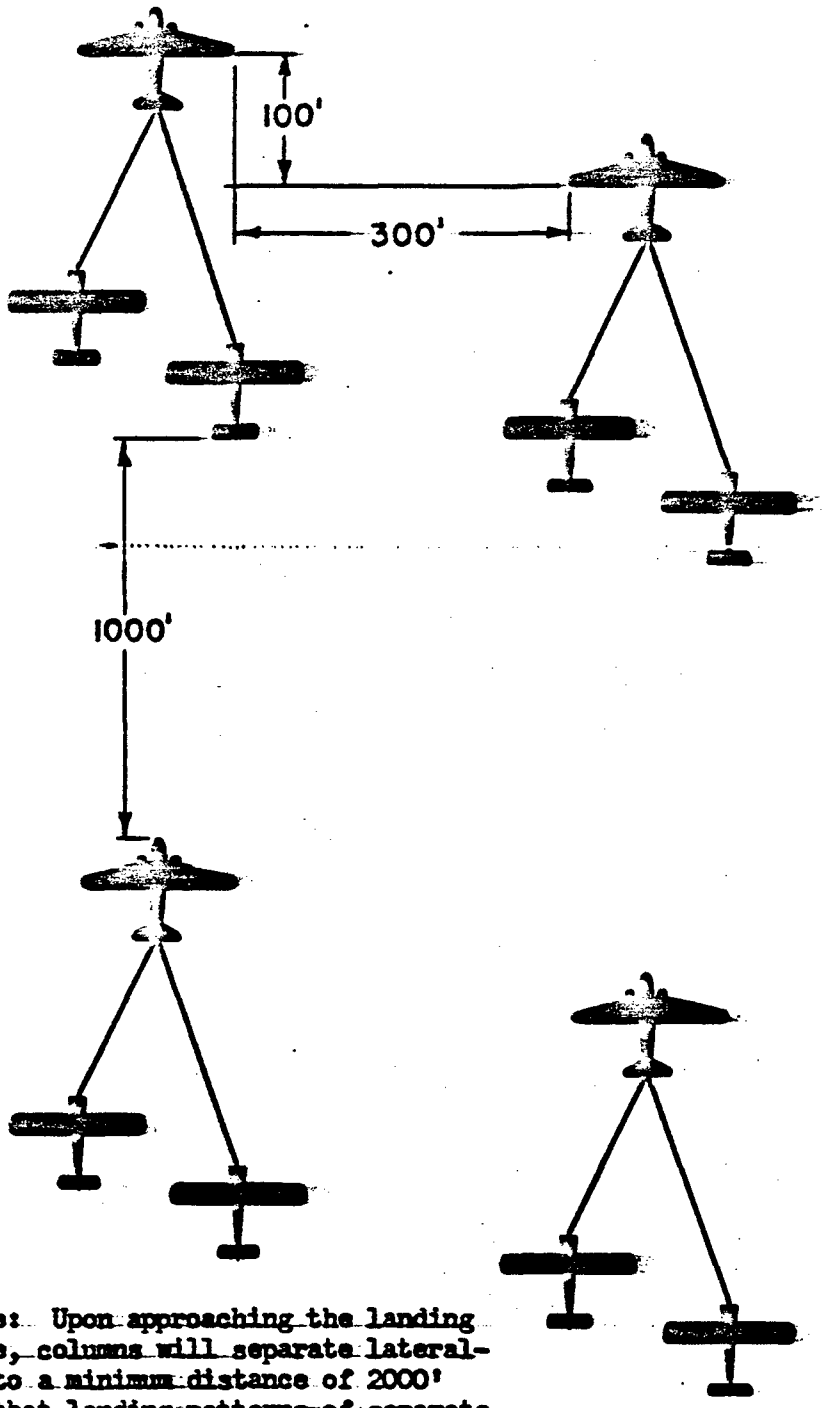


FIG. 4 - GLIDER FORMATION "C"



Note: Upon approaching the landing zone, columns will separate laterally to a minimum distance of 2000' so that landing patterns of separate columns will not conflict. Left turn in landing patterns will be normal procedure.

FIG. 5 - GLIDER FORMATION "D"

APPENDIX II

SOP, AIR LANDING AND AIR EVACUATION

APPENDIX II

HEADQUARTERS
___ TROOP CARRIER COMMAND

MEMORANDUM)
:
NO. ____)

Place_____

Date_____

STANDARD OPERATING PROCEDURE
AIR LANDING AND AIR EVACUATION

1. PURPOSE:

To establish uniform methods of training and operations throughout all assigned troop carrier units for participation in air landing and air evacuation missions.

2. TERMS.

a. Lashing.— The tying of cargo to prevent shifting in flight.

b. Weights and balance.— The computation of weight of supplies or personnel to provide proper stability of aircraft in flight.

3. DUTIES OF PERSONNEL.

a. Air cargo resupply squadrons.—

(1) Receive, store, and package all classes of supplies arriving at designated concentration points or storing and packing points for delivery to final destination by air transportation.

(2) Distribute and move these supplies to airplane takeoff points.

(3) Load airplanes.

(4) Where cargo is to be dropped, unload cargo from airplanes in flight.

b. Troop carrier squadrons.—

(1) Pilots.

(a) Maintain precautionary measures to avoid damage or injury to aircraft and to personnel engaged in the loading operation.

(b) Check aircraft for proper loading to conform with limitations.

(c) Check lashings for slack and proper tying, and supervise corrections.

(d) Brief crew members on emergency procedures.

(2) Crew Chiefs.

(a) Make proper preliminary preparations for loading, e.g., remove cargo door if necessary and insure that loading ramps, rope, and litter racks are available.

(b) Supervise loading and tying as pilot's representative.

4. PREPARATION OF SUPPLIES FOR AIR LANDING.

a. All supplies will be prepared for shipment by air in accordance with appropriate training bulletins, technical orders, field manuals, and directives.

5. LOADING OF AIRCRAFT.

a. Safety factors.—

(1) Distribution of load to avoid excess weight concentration in the floor construction of the aircraft.

(2) Limitation of maximum weight of load to the gross design weight loading of aircraft.

(3) Placing of load to insure that center of gravity of airplane is within desired stability limit.

(4) Lashing of load to prevent shifting of cargo in flight.

b. Preliminary preparations and precautions.—

(1) Wheels of aircraft must be braked and chocked to prevent possible movement during loading.

(2) Cargo doors removed if necessary to facilitate loading.

(3) Ramps properly installed.

(4) Cargo compartment cleared to receive equipment and/or personnel.

(5) When loading from trucks, chocks placed to prevent movement of trucks.

(6) All necessary materials available, e.g., tie-down rings, ropes, chains, straps, hoists, ramps, litters.

c. Loading.—

(1) Loading plan will be based on normal payload for aircraft being used.

(2) All loads will be planned for easiest and most rapid unloading, regardless of loading time.

(3) Proper weight distribution will be maintained, and slide rule will be consulted for weights and balance to effect desired center of gravity.

(4) Emphasis will be placed on care exercised in loading operation, as aircraft structure is of light construction and will not withstand sudden or severe blows. Proper care will prevent damage and possible loss of the aircraft for the operation.

d. Lashing.—

(1) Purpose of lashing is to prevent forward, upward, side, and rearward movement. The greatest force on landing is in forward direction.

(2) Lashings will be made with rope, cable, straps, chains, or other pliable material. Special devices may be used to pull lashings tight.

(3) Lashings should be made at angles of from 30 to 45 degrees with the direction of expected thrust, with tying accomplished at approved strong points.

(4) Lashings will be of a type which can be quickly released upon reaching destination to facilitate rapid unloading.

e. Unloading.—

(1) Advance notice will be given to unloaders before arriving at destination.

(2) Unloading will be accomplished rapidly but in a manner to prevent damage to aircraft by rough handling of cargo.

6. TYPES OF MISSIONS.

a. Shuttle type missions are flown if:

(1) Air superiority is held by friendly air forces.

(2) Bombers and fighters are making continual strikes in advance of destination.

(3) Flight is of short duration and continuous fighter cover is maintained over destination.

(4) Fighter cover is unavailable.

(5) Destination is beyond fighter range.

(6) Forward landing fields will not accommodate a formation.

b. Formation type missions are flown if:

(1) Transported units must keep all personnel and equipment intact to operate efficiently.

(2) Enemy activity is prevalent at destination.

(3) Safe landings can be made only for a short period.

(4) Ample fighter protection is available.

(5) Pilots are inexperienced and need guidance to destination.

c. Advantages and limitations of the shuttle and formation type missions are summarized as follows:

(1) Individual flights require less time than formation missions and result in more weight being carried daily. Formation flights require considerable time for take-off, assembly, rendezvous with fighters, landing at destination, and landing at home base upon return.

(2) Single aircraft are better adapted to adverse weather conditions than formations. Weather may also interfere with successful fighter escort of troop carrier formations.

(3) Formation missions result in a more urgent maintenance problem than individual flights.

(4) Formation missions require complete radio silence

except in an emergency. Flight leaders will be responsible for observance of this rule.

(5) Formation missions are advantageous for the employment of new crews, thus providing acquaintance with terrain, check points, weather, approaches to fields, and fighter escort procedure which is difficult to obtain individually.

(6) Formation missions are necessary for the homogeneous movement and delivery of units and their equipment.

d. Preparation and procedures.—

(1) A specific plan for each formation flight must be accomplished 24 hours prior to time of takeoff. Coordination among squadron, group, wing, and higher headquarters will be promptly achieved. The flight plan will include parking of aircraft to facilitate rapid and efficient taxiing and takeoff.

(2) On occasions when no fighter aircraft are available for escort, it is standard procedure for troop carrier aircraft not to fly in formation. Further, when space for parking, taxiing, takeoff, and landing is limited in newly constructed fields, troop carrier aircraft will make individual and well spaced flights to prevent concentration and overcrowding.

(3) The use of formations or single aircraft is dependent on the prevalent situation in the operational area. However, the following statements will serve as a general guide:

(a) Shuttle flights are recommended to be used as much as possible in preference to formations, as individual flights involve less danger to personnel or equipment.

(b) A fighter screen is the most efficient means of protection, provided that shuttle service is used and enemy activity is limited between departure and landing points.

(c) New crews must be briefed by experienced crews, should fly two or three missions with experienced crews, and should have as much formation flying as possible before being employed on shuttle service.

(d) All air landing missions, whether shuttle or formation type, require close coordination between

fighter and troop carrier aviation as to formations, call signs, route, rendezvous point, type of cover, and length of time at destination.

(e) Radio silence is imperative.

(f) Briefing on landing fields, routes, code words, and the enemy situation must be accomplished prior to each day's flights.

e. Important factors.—

(1) Choice of shuttle or formation type mission.

(2) Enemy situation in the operational area.

(3) Fighter escort available for troop carrier protection.

(4) Availability of loading and unloading personnel and facilities.

(5) Experience of crews in handling various type loads.

(6) Suitable weather conditions.

(7) Sufficient troop carrier aircraft to accomplish the mission.

7. EVACUATION.

a. All evacuation missions will be coordinated with the field commander and medical units concerned, and combined whenever practicable with air landing or supply missions.

b. All casualties will be evacuated from forward landing strips or fields as quickly as possible or when the situation is such that no interference with the primary mission will be experienced by troop carrier aircraft.

c. Rear collecting points for air evacuation casualties will be notified in advance, if possible, of the arrival of incoming troop carrier aircraft so that casualties may be removed promptly and expeditiously.

d. Air evacuation of casualties insures early and thorough medical care and decreases the number of fatalities incident to slower means of transportation. Successful air evacuation is highly important as a morale factor, aiding greatly in psychological effect upon remaining troops.

APPENDIX III

SOP, AERIAL RESUPPLY

APPENDIX III

HEADQUARTERS
____ TROOP CARRIER COMMAND

MEMORANDUM)
:
NO. ____)

Place _____

Date _____

STANDARD OPERATING PROCEDURE
AERIAL RESUPPLY

1. PURPOSE:

To establish uniform methods of training and operations throughout all assigned troop carrier units for participation in aerial resupply missions.

2. EMPLOYMENT.

a. Aerial resupply serves the purpose of:

(1) Relieving ground troops from carrying reserve items of equipment.

(2) Supplying troops in places inaccessible to other means of delivery.

(3) Permitting freer deployment of ground troops by not depending on ground supply routes being kept intact.

b. Aerial resupply can provide all items of equipment which can be packaged into bundles for free dropping or containers attached to parachutes. This method can be used to supply individuals or complete infantry divisions.

3. TERMS.

a. Free drop.— Method of dropping supplies without parachutes.

b. Para-drop.— Method of dropping supplies with parachutes.

c. Packers, loaders, kicker-outers.— Personnel trained to receive, store, package, deliver, load, and unload supplies for aerial delivery.

d. Target, drop zone, dropping area.— The geographical location where supplies are to be dropped.

4. DUTIES OF PERSONNEL.

a. Air cargo resupply squadrons.—

(1) Receive, store, and package all classes of supplies arriving at designated concentration points or storing and packing points for delivery to final destination by air transportation.

(2) Distribute and move these supplies to airplane takeoff points.

(3) Load airplanes.

(4) Where cargo is to be dropped, unload cargo from airplanes in flight.

b. Troop carrier squadrons (pilots and crew chiefs).—

(1) Preflight.

(a) Inspect jump lights and bail-out bell.

(b) Inspect chute packs for sufficient shroud line length of 15 feet.

(c) Inspect aircraft for protrusions which may hinder accurate dropping of supplies, and make necessary corrections.

(d) If carrying para-packs, check security of containers in racks.

(e) Check load for proper loading, weight, and balance.

(2) Before takeoff.

(a) Brief all crew members on emergency procedures for jettisoning, bailing out, and crash landings. (See paragraph 7).

(3) Before drop.

(a) Alert kicker-outers five minutes before reaching drop zone so that supplies may be untied and final preparations for the drop completed.

(b) Accomplish appropriate signals between air and ground as per SOI in effect.

(4) During drop. (See paragraph 9.)

5. PACKING FOR AERIAL RESUPPLY.

a. Preparation.— If it is at all possible to anticipate approximately the type and amount of supplies that will be requested, these supplies should be packed as far as possible in advance of the mission.

b. Free drop.—

(1) Non-fragile and/or light items of equipment can be dropped without parachute, provided sufficient padding is packed around the items in suitable containers to eliminate the possibility of breakage upon impact.

(2) The condition of the terrain is a prime factor. Usually free dropping can be accomplished only on soft ground, such as paddy fields, marshes, sand, or any cultivated area cleared of hard obstructions.

(3) Weight of free dropping bundles should never be less than 15 lbs. per cubic foot of volume; otherwise, packages may fail to fall sufficiently fast, be caught in the slip stream, and hit the tail surfaces of the airplane. The maximum weight of a free dropping package is governed by its weight in proportion to its cubic volume and degree of fragility of contents, to avoid having the package strike the ground too hard with resultant breakage.

c. Para-drop—

(1) It is advisable to keep as many parachutes packed as possible, depending on the climate and the normal time interval between requests for resupply missions. Parachutes should not be attached to bundles until just prior to loading on the aircraft for the resupply flight.

(2) The weight of para-drop bundles should not exceed the maximum allowable weight for the canopy being used. Bundles should also be heavy enough to clear the tail surfaces.

(3) Containers should be evenly packed. Unevenly packed containers tend to oscillate in the air, resulting in loss of wind from the parachute and causing a quicker descent and heavier impact.

(4) Radio equipment will always be packed with at least two thicknesses of two-inch felt or other suitable material (cotton, straw, rice husks) sourrounding it on all sides.

This equipment should be packed so that tubes will be upside down when the bundle is suspended from the parachute risers, thus allowing for elongation of tube filaments without damage.

(5) Containers carrying liquid should not be filled to the top, thus providing a cushion of air which prevents bursting of containers upon heavy impact.

6. LOADING.

a. The C-47 payload varies inversely with the fuel load necessary for the round trip to the drop zone, and is also governed by maximum takeoff and landing weight. Aircraft of this type are provided with six external para-racks which may be attached under the fuselage. Each para-rack is capable of carrying up to 300 lbs.

b. Supplies carried within the aircraft will be loaded so that the center of gravity will be within allowable limits.

c. Para-drop bundles should be loaded in the aircraft leaving a center passageway to prevent tearing and premature opening of the parachute packs by being stepped on. However, to avoid a tail-heavy condition, it may be necessary in some instances to stack a few bundles in the aisle.

d. Free drop bundles containing unbreakable items may be placed in the center aisle or stacked to the rear of the para-drop bundles.

e. As supplies are unloaded in reverse order of loading, fragile items are loaded first and ejected last. (See paragraph 9d.)

f. All cargo will be tied to prevent shifting and to facilitate quick removal of lashing.

7. BRIEFING.

a. Troop carrier crews.— Troop carrier crew personnel will be briefed on each aerial resupply mission. This briefing will include:

(1) Nature of terrain surrounding target.

(2) Recommended pattern to be flown during drop.

(3) Location, size, elevation of target.

(4) Communication procedures as per SOI in effect.

(5) Enemy situation.

(6) Other pertinent data.

b. Ground unit personnel.— Ground personnel will be instruc- i in training and operations to clear the dropping area upon the arrival any aircraft. If signals are to be interchanged, however, the signal n will remain in the area.

c. Emergency procedures.— Emergency procedures for crash dings, bailing out, and jettisoning cargo will vary somewhat, but may low this general outline:

(1) Crash landings.

(a) Positions will be assigned for each member of the crew and passengers, if any.

(b) Personnel will be briefed on conduct before and after crash landing.

(c) Personnel will be briefed on signals to be used for warning, consisting of oral warning by appointed crew member and/or intermittent ringing of bail-out buzzer.

(2) Bailing out.

(a) All parachutes will be tried on for correct fit. Each individual will locate parachute where he can find it quickly.

(b) Parachute drills will be carried out during flight, without forewarning crew members, to obtain proficiency in attaching parachutes.

(c) Personnel will be briefed on warning signals, consisting of oral warning and/or continuous ringing of bail-out buzzer.

(3) Jettisoning cargo.

(a) Emergencies such as loss of an engine may necessitate jettisoning of cargo to maintain aircraft at a safe altitude. All removable cargo or as much as is deemed necessary by the pilot will be ejected.

(b) Personnel will be briefed on warning signals, such as oral warning at high altitudes or prescribed ringing of bail-out buzzer at low altitudes.

8. DROP SIGNALS.

a. Standardization.— All crews will adopt a standard set of signals to be used between pilots and kicker-outers indicating ejection of cargo over the dropping area. Visual hand signals for day operations and light signals for night operations are most efficient.

b. Day Operations.—

(1) Dropping crew are notified five minutes before arrival at dropping area to unlash and stack cargo for ejection.

(2) Co-pilot raises left hand in vertical position 20 seconds before reaching release point. Kicker-outers take assigned positions at rear cargo door and await drop signal.

(3) Upon reaching release point, pilot gives signal to co-pilot, using a phrase such as "OK", "Cut", "Drop", etc. Co-pilot then drops hand to downward position, and kicker-outers immediately eject cargo.

(4) Many targets are limited in size and allow only an initial drop on first run. Longer targets will permit additional supplies to be ejected. Cessation of drop is indicated by short ring of bail-out buzzer.

(5) If it is desired to pass target without dropping, the co-pilot will move his hand back and forth in a side-wise motion, indicating a "dry run".

(6) In coordination with co-pilot's signals, the kicker-outers, after observing drop, may indicate results as follows:

(a) Supplies fell short: holding wrist with one hand.

(b) Supplies fell over: holding elbow with one hand.

(c) Supplies fell short and to right or left: Holding wrist with thumb extended right or left.

(d) Supplies fell over and to right or left: holding elbow with thumb extended right or left.

(e) Supplies on target: conventional OK sign with thumb and forefinger forming a circle.

(7) After receiving crew's signal, pilot can make required corrections on next run over target.

c. Night operations.—

(1) Dropping crew are notified five minutes before arrival at dropping area to unlash and stack cargo for ejection.

(2) Red paratroop warning light is flashed on 20 seconds before reaching release point. Kicker-outers take assigned positions at rear cargo door and await drop signal.

(3) Upon reaching release point, pilot gives signal to co-pilot, using a phrase such as "OK", "Out", "Drop", etc. Co-pilot then flashes green light, and kicker-outers immediately eject cargo.

(4) Many targets are limited in size and allow only an initial drop on first run. Longer targets will permit additional supplies to be ejected. Cessation of drop is indicated by short ring of bail-out buzzer.

(5) If it is desired to pass target without dropping, the co-pilot will turn off the red warning light.

(6) Results of drop will usually be unobserved, but if results are seen by kicker-outers, an oral report will immediately be given to pilot.

9. DROPPING AREA AND TERRAIN.

a. The ideal dropping area is a fairly flat and more or less rectangular area about 800 yards by 300 yards. Terrain immediately surrounding the dropping area should be as clear of obstacles as possible.

b. Hilltops are preferable to valleys, as it is difficult for a heavily loaded aircraft to climb out of a valley fast enough to avoid neighboring hills. Ground troops at hilltop locations are able to keep a lookout for approaching aircraft and display identification and dropping signals more efficiently.

c. Thick woods surrounding the dropping area are at times unavoidable, but present a definite disadvantage because identification of the dropping area is more difficult and "over" and "short" drops are more difficult to retrieve.

d. Terrain features will be used as check points for locating a dropping area.

(1) Full briefing on the particular terrain near the dropping area is important and will determine the approach to and departure from the target on the dropping runs.

(2) The drop zone should be located near some prominent landmark for easier identification.

e. Prearranged ground identification signals will aid in locating the dropping area.

(1) Ground troops may use smoke fires to attract aircraft. Fires should be displayed in a prearranged pattern to distinguish them from enemy fires.

(2) Ground troops should display an arrow to designate the desired direction of approach for dropping.

(3) An excellent ground method of marking the dropping area is as follows:

(a) An arrangement of panels or lights forming an inverted "L", three markers on the short arm, five on the long arm, one being common to both arms.

(b) Markers to be spaced at 200' intervals, if space permits.

(c) The "L" is placed in such a manner that a rectangular lefthand pattern accomplished by the aircraft will avoid high ground or nearby hills or mountains. To accomplish this, the approach is along the long arm toward the short arm.

(d) The drop is accomplished within an area bordered by the long arm and an imaginary line about 200' to the right side. Upon passing the short arm, a 90 degree turn is made and a rectangular pattern is completed.

f. At times aircraft may be unable to locate a dropping area because of inadequate marking of target, alteration in position due to enemy interference, or adverse weather conditions. For each resupply mission alternate targets should be provided, if possible, to avoid having aircraft return to base with full loads. Selection of other targets will be governed by the fact that the supplies can be used and are required at the alternate site.

10. DROPPING SUPPLIES.

a. Procedure.—

(1) Before dropping on a target, pilot will buzz the area to warn ground personnel to clear the drop zone.

(2) The pilot will line the aircraft on the approach to

the dropping area and will give appropriate signals to kicker-outers. Proper air speeds and altitudes will be observed in so far as possible, with the aircraft in a tail-high position.

(3) Kicker-outers will accomplish drop upon appropriate signals and report inaccuracies immediately so that corrections can be made on next run.

b. Free drop.—

(1) The object of free dropping is to reduce the horizontal velocity of the packages to a minimum before striking the ground, and at the same time to allow as little increase as possible in the vertical rate of descent.

(2) When using free drop, aircraft should be flown at 150 to 200 feet above the ground and at 110 to 120 mph.

c. Para-drop.—

(1) It is essential that para-drop packages be released at low speed and high altitude to avoid damage to the container and its contents. The rate of descent is governed by the size and number of attached parachutes. Aircraft should be flown at 200 to 250 feet above the ground and at 110 to 130 mph.

(2) Parachutes are opened by means of a static line, one end of which is attached to a strong point inside the airplane and the other to the apex line at top of parachute. This pulls the chute out of its pack, which is attached to the container. The thread connecting static line to apex line breaks under the container's weight after the parachute has been pulled from its pack to the length of the rigging lines.

d. Precautions and limitations.—

(1) Free drop containers will be dropped first and therefore loaded on the airplane last. This procedure will eliminate possible breakage caused by free drop containers striking previously dropped para-drop containers.

(2) When several aircraft are to fly over the same target at approximately the same time, each aircraft should be loaded with an equal portion of free drop and para-drop bundles. In this way, all aircraft can eject free drop containers before para-drop containers are released.

(3) Pilots will avoid making a tight pattern around the dropping area, in order to give kicker-outers sufficient time to stack supplies at rear cargo door for ejecting. A tight pattern will result in a longer time being spent and a greater number of runs being made over the target.

(4) Size of packages will limit the number which can be stacked at the rear cargo door. Bundles should not be stacked higher than five feet.

(5) The number of bundles which can be ejected during one run is limited by the size of the dropping area and the ability of the kicker-outers to push them out in the time available.

(6) Flaps and lowered landing gear to slow aircraft to desired speed should not be used, as this procedure causes excessive turbulence of the air flow over the aircraft and may result in tearing of parachutes.

(7) Speeds in excess of 130 mph may be used in emergencies. However, the weight of bundles in proportion to their cubic volume must be considered to insure sufficient weight to clear the tail surfaces but not too much weight to cause the parachute to split upon opening.

11. INACCURACIES IN DROPPING.

a. Recovery of supplies often amounts to but 50% in areas of heavy jungle growth and small clearings. Supplies may snag in tall trees inaccessible to ground troops or may drop out of sight in heavy jungle growth as a result of over or under shooting the dropping area. Care must be taken in timing runs and drops over small targets.

b. Although slight variations in speed and altitude exert a comparatively minor effect on the accuracy of dropping, they are of major importance when dropping vital stores and supplies. To obtain an estimate of dropping accuracy, it is necessary to measure the degree of dispersion of packages on landing and to examine causes of inaccuracy at time of ejection from the aircraft.

c. Principal causes of dropping inaccuracies are to be found in the experience of pilots and crews.

(1) An experienced pilot can drop all types of supplies in an area of 100 yards by 50 yards. With less experienced pilots, errors have been observed as great as 400 yards across and 1000 yard in line of flight.

(2) Experience of crews has considerable effect on accuracy, both in avoiding initial scatter of packages and in ejecting them within the allotted time. The time lag between the drop signal and initial drop varies with different crews. Thus, a pilot when judging his drop signal will take into account the speed of action of his crew as well as his altitude and speed at the release point. Crews should be kept intact to maintain a peak of proficiency.

d. Para-drop and free drop inaccuracies.—

(1) Parachute failures:

Cause	Remedy
(a) Too heavy load, split chute.	Do not exceed maximum load for chute being used.
(b) Tearing of canopy, manufacturing fault.	Inspection.
(c) Static line fouling and breaking.	Care in ejection of supplies.
(d) Attachment straps breaking.	Inspection before packing.
(e) Canopy not opening, damp and sticky.	Airing and drying.
(f) Rigging line fouling around canopy, unable to open.	Care in packing and folding in parachute pack.
(g) Insecure attachment of static line.	Careful attachment.
(h) Altitude for drop too low, no time for parachute to open.	Recommended altitude be observed.
(i) Altitude too high, supplies drift.	Recommended altitude be observed.

(2) Free drop failures:

Cause	Remedy
(a) Too many bundles ejected at	Bundles limited to

	one time in trail, causing excessive scatter.	number crew can handle efficiently.
	(b) Release too early or late.	Timing and team work.

e. Wind drift.—

(1) Strong winds have a detrimental effect on the accuracy of para-drops. A parachute and container will drift 2.8 yards per every 100 feet of descent per every one mpy of wind velocity.

(2) Four forces act upon objects released from an aircraft:

(a) Forward momentum of aircraft in flight.

(b) Backwash of propeller.

(c) Force of gravity.

(d) Wind friction.

(3) In aerial resupply the first two forces generally neutralize themselves to the extent that the following wind drift formula will serve most practical purposes:

R = Rate of descent in feet/second;

W = Wind velocity in feet/second.

H = Height in feet above ground at point of release.

$$\frac{H}{R} \times W = \text{Drift in feet.}$$

Example: A para-drop container with a rate of descent of 25 feet/second is dropped from 200 feet with wind velocity 30 mph.

30 mph = 44 feet/second.

$$\frac{200}{25} \times 44 = 352 \text{ feet drift.}$$

12. REMOVAL OF SUPPLIES.

a. Supplies by para-drop should be marked for easy identification by sewing white patches or streamers to packages, attaching luminous metal discs to packages, and/or attaching small electric lights. The parachute itself also serves as a good marker.

b. To facilitate rapid collection and disposal of stores, the

receiving unit should know when to expect aircraft so that ground crews can be ready and what types of supplies will be dropped so that storage facilities can be arranged in advance.

c. Supplies are gathered after aircraft have completed final drop.

(1) All containers known to include fragile items, identified by color of parachute, containers, or streamers, are removed first.

(2) Free drop articles are removed last.

(3) Parachutes are removed, stacked, and sent to the rear by first available means.

d. Supply dumps should be located along sides of dropping area. If located at ends of area, safety zones must be provided for protection from "over" and "short" drops.

13. AIR-GROUND SIGNALS.

a. Prior to departure on aerial resupply missions, personnel will be briefed on letters and colors for air-ground challenging and identification.

b. Full use should be made of signal panels as per SOI in effect. Panels usually mark a drop zone in the form of an inverted "L" (see paragraph 9e). Ground control position is located at the intersection of long and short arms of the "L", where aircraft can be signalled with an Aldis lamp in the following manner:

(1) Steady red light: unable to take drop, return to base.

(2) Blinking red light: stand by, do not attempt drop.

(3) Green: all clear, proceed with drop.

c. Radio communication between aircraft and drop zone will aid in obtaining corrections on point of release of supplies, receiving requests for urgently needed supplies, and receiving directions when within visual distance to help locate dropping area.

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THE ARMY AIR FORCES BOARD
Orlando, Florida

4 September 1945

PROJECT DISTRIBUTION LIST

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[redacted]

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TITLE: Tactical Doctrine of Troop Carrier Aviation - and Appendixes I-III - AAF Board Project No. 3189A481

AUTHOR(S) : (Not known)
ORIG. AGENCY : Air Proving Ground, Eglin Air Force Base, Fla.
PUBLISHED BY : (Same)

ATI- 87 724
DIVISION: (None)
CODO. AGENCY NO.: 3189A461
PUBLISHING AGENCY NO.: (Same)

DATE	U.S. CLASS.	COUNTRY	LANGUAGE	PAGES	ILLUSTRATIONS
Sept '45	Restr.	U.S.	English	89	diagrs

ABSTRACT:

"Not Abstracted"

DISTRIBUTION: Copies obtainable from CADO.

FIELD :
DIVISION: Military Operations (24)
SECTION: Strategy and Tactics (6)

SUBJECT HEADINGS: Air Force - Tactical employment
Troops - Air transportation

Central Air Documents Office
Wright-Patterson Air Force Base, Dayton, Ohio

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR MOBILITY COMMAND (AMC)

29 MAY 1998

MEMORANDUM FOR DTIC-RSM
8725 John H. Kingman Road, Station 0944
Fort Belvoir VA 22060-6218

FROM: HQ AMC/SCYN[FOIA]
402 Scott Drive Room 132
Scott AFB IL 62225-5363

SUBJECT: Distribution Limitation on DTIC Documents (FOIA Request – Mr. Ian Sullivan)

1. On 27 March 1998, Ms. Kelly Akers from your office forwarded 10 documents to 11 CS/SCSR, Washington DC as responsive documents to a FOIA request from Mr. Ian Sullivan. Air Force was considered to be the controlling activity to determine releasability of the documents. Ms. Akers requested notification if the Air Force determined the distribution statements should be changed.

2. Five of the documents were sent to Headquarters Air Mobility Command, Scott AFB IL for release determination. Upon review, we determined documents listed below are releasable to the requester and the restricted distribution statement can be removed.

ATI 075959	Suitability of the B-24 Type Aircraft for Troop Carrier Operations
ATI 076730	Suitability of the B-17 Airplane for Troop Carrier Operations
ATI 087724	Tactical Doctrine of Troop Carrier Aviation
B972097 ✓	Operational and Tactical Suitability of the c-46A Airplane for Troop Carrier Operations – AAF Board Project No. (M-1) 105
B972518 ✓	Parachute Questionnaire Project

3. Direct any questions to Ms. Glenda Allen at DSN 576-4975 or 618-256-4975.

DOUGLAS R. WALTON, GS-12
Chief, Records Management
Directorate of Communications & Information

Per my telecon with Glenda Allen on 8 Jun 98, the documents can be marked "available to the public." It wasn't real clear in her letter.

Kelly Akers
DTIC-RSM
8 Jun 98